# Eastern Busway
# EB2 and EB3 Residential

**Integrated Transport Assessment**

Document Number: EB234-1-PL-RP-Z2-000032-A2

# Quality Information

Document Number: EB234-1-PL-RP-Z2-000032-A2

| Document History and Status | | | |
|---|---|---|---|
| **Rev** | **Date** | **Author** | **Status** |
| A1 | 12 Nov 2021 | Josie Ackroyd, Takeshi Nakamura, Christine Lee, Nathan Lowe, XiaoFan Lin, Jacques Van den Heever | Draft for internal review |
| A2 | 12 Jul 2022 | Josie Ackroyd, Takeshi Nakamura, Christine Lee, Nathan Lowe, XiaoFan Lin, Jacques Van den Heever | Final |

| Document Approval | | | | | |
|---|---|---|---|---|---|
| **Rev** | **Action** | **Name** | **Position** | **Date** | **Signature** |
| A2 | Reviewed by | Shane Doran | Transportation Manager | 13 Jul 2022 | On file |
| 1 | Approved by | Dean Coutts | Design Lead | 13 Jul 2022 | On file |
| 2 | Approved by | Roger McDonald | Principal Alliance Planner | 18.07.2022 | On file |

# Terms and Definitions

**Table 1: Terms and definitions**

| Abbreviation and Definitions | Description |
|---|---|
| AADT | Average Annual Daily Traffic |
| AEE | Assessment of Effects on the Environment |
| AFC | Auckland Forecasting Centre |
| AMETI | Auckland-Manukau Eastern Transport Initiative |
| AC | Auckland Council |
| AT | Auckland Transport |
| A2B | Airport to Botany |
| AUP(OP) | Auckland Unitary Plan (Operative in part) 2016 |
| BPO | Best practicable option |
| CAS | Crash Analysis System |
| CEMP | Construction Environmental Management Plan |
| CMA | Coastal Marine Area |
| CoPTTM | Code of Practice for Temporary Traffic Management |
| CTMP | Construction Traffic Management Plan |
| DOS | Degree of Saturation |
| EB1 | Eastern Busway 1 (Panmure to Pakuranga) |
| EB2 | Eastern Busway 2 (Pakuranga Town Centre) |
| EB3 Commercial/ EB3C | Eastern Busway 3 (Pakuranga Creek to Botany) |
| EB3 Residential/ EB3R | Eastern Busway 3 (SEART to Pakuranga Creek) |
| EB4 | Eastern Busway 4 (Botany Town Centre Station) |
| EBA | Eastern Busway Alliance |
| HNZPT | Heritage New Zealand Pouhere Taonga |
| HNZPTA | Heritage New Zealand Pouhere Taonga Act 2014 |
| ITA | Integrated Transport Assessment |
| km | Kilometre(s) |
| km/h | Kilometres per hour |
| LOS | Level of Service |
| m | Metre(s) |
| $m^2$ | Square Metre(s) |
| $m^3$ | Cubic Metre(s) |
| MCA | Multi Criteria Analysis |
| MSM | Macro Strategic Model |
| NES - CS | Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 |
| NES - FW | Resource Management (National Environmental Standards for Freshwater) Regulations 2020 |
| NPS - FM | National Policy Statement for Freshwater Management 2020 |

| | |
|---|---|
| NPS - UD | National Policy Statement for Urban Development 2020 |
| NoR | Notice of Requirement |
| NSAAT | No Stopping at All Time |
| NZCPS | New Zealand Coastal Policy Statement 2010 |
| NZGTTM | New Zealand Guide to Temporary Traffic Management |
| OD and OW | Over-Dimension and Over-Weight |
| PWA | Public Works Act 1981 |
| RAMM | Road Assessment and Maintenance Management |
| RASF | Roads and Street Framework |
| RTN | Rapid Transit Network |
| RRF | Reeves Road Flyover |
| RMA | Resource Management Act 1991 |
| SSA | Safe System Assessment |
| TCQSM | Transit Capacity and Quality Service Manual |
| tcu | Through car equivalent units or passenger car units |
| v/c | Volume over capacity ratio |
| WRRE | William Roberts Road Extension |

# Table of Contents

# Figures

# Tables

# Executive Summary

## Purpose

The purpose of this Integrated Transport Assessment (ITA) is to evaluate the temporary and permanent transport effects of the EB2 and EB3 Residential (EB3R) components of the overall Eastern Busway Project (the Project) and to recommend mitigation measures as appropriate. This report will form part of the Assessment of Environmental Effects (AEE) supporting the Notice of Requirement (NoR) and resource consent applications of EB2 and EB3R.

## The Need for the Project

Auckland's eastern suburbs have one of the highest levels of journey to work trips by car and lowest use of public transport in Auckland[1]. This is due to a combination of lower density land uses and relatively unattractive bus services, lack of cycle facilities and low urban amenity on main roads.

With regard to transport issues in EB2 and EB3R, it has been identified that the area experiences heavy congestion. Recent population growth and a heavy dependence on private vehicles has put significant strain on the existing road network. Furthermore, projected population growth from both established and new suburbs is expected to exacerbate this issue.

Lastly, congestion due to the growth in commercial activity is also anticipated. Ti Rakau Drive and SEART are important for the efficient movement of freight and goods vehicles, connecting the commercial areas of East Tāmaki, Highbrook, Botany, Pakuranga and Highland Park to the wider region.

Without intervention, demand for public transport, walking and cycling will remain low, the heavy reliance on car travel will continue and the road network will experience significantly increased congestion. This will further impede the efficient movement of people and goods within the area, lead to detrimental environmental outcomes and exacerbate the area's limited access to opportunities compared to the rest of the region both in terms of the quality of life for residents and the economic wellbeing of businesses. It will also limit the area's potential to sustainably accommodate further residential and employment growth.

## Benefits of the Project

The Eastern Busway programme presents an opportunity to address these problems by extending the rapid transit, high frequency busway between Panmure and Pakuranga, through to Botany Town Centre. The Project will include new walking and cycling connections, placemaking, urban renewal initiatives and improvements for general traffic. The end result will see customers being able to travel between Botany and Britomart by bus and train in less than 40 minutes, which is 20 minutes quicker than the current journey times.

[1] SNZ Census 2018

EB2 and EB3R will help alleviate congestion, principally through the diversion of traffic from the Ti Rakau Drive / Pakuranga Road intersection and onto the Reeves Road Flyover (RRF). This diversion will reduce the volumes of through-traffic within the Pakuranga Town Centre and local roads. As such, EB2 and EB3R's contribution to congestion reductions will improve travel times, supporting the rapid movement of freight and people.

The Project will also provide increased transport choices for residents and visitors. The dedicated bus lanes and stations will improve the public transport experience for passengers and make it more attractive to current private vehicle users. Increased uptake of public transport will also ease congestion and reduce greenhouse gas emissions. Similarly, the Project's walking and cycling investments make those transport modes safer and more attractive to users. Lastly, an additional positive effect associated with EB2/EB3R, and the wider Project, is improved accessibility.

Therefore, reduced congestion, better public transport, safer walking and new cycling infrastructure will improve the ability for both local residents and visitors to access jobs, education, recreation, housing and healthcare. Given the above, EB2 and EB3R will have significant positive effects for Auckland.

## Assessment of Effects

Overall, through AIMSUN and SIDRA modelling assessments, EB2 and EB3R are expected to lead to acceptable intersection operations across the network. Importantly, bus movements are predicted to operate at LOS C and with spare capacity. The RRF is expected to relieve congestion around the Pakuranga Town Centre, and significant improvements in travel times are expected overall, especially between Botany in the east and Pakuranga and SEART in the west.

EB2 and EB3R are predicted to significantly increase public transport patronage in the future. As such, bus station platforms and loading areas have been designed to provide appropriate levels of service and capacity to support this uptake. Furthermore, bus service headways will be improved, and travel times are predicted to decrease overall, leading to faster and more reliable public transport trips. The combination of these public transport upgrades and improvements is expected to significantly increase public transport mode share, which in turn will reduce congestion and greenhouse gas emissions.

Dedicated footpaths and cycleways will improve pedestrian and cyclist amenity and safety which will provide users with a more attractive mode of travel and supports the uptake of cycling. Furthermore, the cycleways will improve accessibility to the bus stations, resulting in increased catchment and mode shift to public transport.

Lastly, through a Safe System Assessment (SSA), EB2 and EB3R are expected to provide an overall safer transport system for all modes of transport through the project areas with the aim to reduce fatal and serious injury crashes.

## Mitigation

Overall, the temporary effects of construction in the project areas will be mitigated appropriately and are considered to be negligible or very low. Workforce Travel Management Plans will be developed to reduce private vehicle trips and to increase worksite accessibility through more travel options. Construction Traffic Management Plans (CTMPs) will be developed to avoid, remedy or mitigate the adverse effects of construction on transport, parking and property access so far as is reasonably practicable. The CTMPs will be developed in accordance with the conditions of consent and will include management strategies, controls and reporting protocols to achieve this. Hours of operation will be controlled in part by the Project's consent conditions and management plans, including the Construction Noise and Vibration Management Plan (CNVMP).

## Conclusions

With the proposed mitigation measures in place, the potential adverse effects during construction and upon completion of EB2 and EB3R are considered to be negligible or very low. Furthermore, the proposed design is predicted to result in significant improvements and a range of benefits overall.

# 1 Introduction

## 1.1 Project Background

The Auckland Manukau Eastern Transport Initiative (AMETI) programme was initiated in 2006 and has become the responsibility of Auckland Transport (AT) following the amalgamation of Auckland's previous local authorities in October 2010. The Eastern Busway Project (the Project)[2] is a flagship project for Auckland and will form a key part of the region's Rapid Transport Network (RTN). It will create dedicated bus lanes to connect people from Botany, Pakuranga, and the surrounding suburbs, to the rail network in Panmure. The Project includes cycling and walking paths, roading and safety improvements and a new Reeves Road Flyover (RRF) to ensure better journey reliability for all modes.

The Panmure to Pakuranga section of the busway (EB1) opened in late 2021. The Eastern Busway Alliance (EBA) has been formed to design and consent the Pakuranga to Botany sections of the Project (EB2,3,4), progressing towards construction, which is expected to start in 2022. The Project will provide a busway from Pakuranga Town Centre in the west to Botany Town Centre in the east. The busway will be approximately 5km long and will be running at grade primarily on Ti Rakau Drive. A median busway (Online Busway) is proposed along Ti Rakau Drive from Pakuranga Road to Gossamer Drive, while a separated busway (Offline Busway) is proposed between Gossamer Drive and Botany Station.

There will be one major interchange station at Pakuranga Town Centre, one major interchange station at Botany Town Centre, and three intermediate stations along Ti Rakau Drive. A separate cycleway and pedestrian footpath are also proposed along the length of Ti Rakau Drive. The proposed busway will serve the major employment areas of East Tāmaki, Botany and Panmure, as well as Botany and Pakuranga Town Centres. The proposed busway will also connect with major interchanges at Botany, including local bus services and Airport to Botany (A2B) RTN services, and at Panmure for suburban rail services.

### 1.1.1 Strategic Context

Auckland's eastern suburbs have one of the highest levels of journey to work trips by car and lowest use of public transport in Auckland[3]. This is due to a combination of lower density land uses and relatively unattractive bus services, lack of cycle facilities and low urban amenity on main roads. Without intervention, demand for public transport, walking and cycling will remain low and the heavy reliance on car travel will continue. This will further impede the efficient movement of people and goods within the area, lead to detrimental environmental outcomes and exacerbate the area's limited access to opportunities compared to the rest of the region. It will also limit the area's potential to sustainably accommodate further residential and employment growth.

The Eastern Busway programme presents an opportunity to address these problems by extending the rapid transit, high frequency busway between Panmure and Pakuranga, through to Botany Town Centre. The Project will include new walking and cycling connections, placemaking, urban renewal initiatives and improvements for general traffic. The end result will see customers being able to travel between Botany and Britomart by bus and train in less than 40 minutes, which is 20 minutes quicker than the current journey times.

[2] Formally known as AMETI.

[3] SNZ Census 2018

### 1.1.2 Project Objectives

The Project has a set of clear objectives and are outlined below:

1. Provide transport infrastructure that improves linkages, journey time and reliability of the public transport network
2. Provide a multimodal transport corridor that connects Pakuranga and Botany to the wider network and increases choice of transport options
3. Safeguard future transport infrastructure required at (or in vicinity of) Botany Town Centre to support the development of a strategic public transport connection to South Auckland
4. Provide transport infrastructure that integrates with existing land use and supports a quality, compact urban form
5. Contribute to accessibility and place shaping by providing better transport connections between, within and to the town centres
6. Provide transport infrastructure that is safe for everyone

### 1.1.3 Benefits of the Project as a Whole

With the Panmure to Pakuranga (EB1) section of the Project completed, once delivered the next stage between Pakuranga and Botany (EB2, 3 and 4) will provide:

- Better connections and sustainable travel options for pedestrians, cyclists, motorists, bus and train customers
- A reliable 40-minute bus and train trip between Botany Town Centre and Britomart (saving 20-minutes)
- Increase in public transport trips from 3,700 to 18,000 per day by 2028
- Increase in public transport mode share from 7% to 25% by 2028
- Reduce carbon emissions by 9,292 kg per day by 2028
- 24,000 more people with access to a rapid transit bus station within 1 km from home
- 5 km of busway between Pakuranga and Botany fully separated from other traffic
- 5 new bus stations with quality facilities
- 12 km of safe and separated walking and cycling infrastructure
- Reeves Road flyover to reduce vehicle congestion around Pakuranga Town Centre
- Encourage and support development of a more sustainable urban form and improve urban amenity
- Accommodates electric buses, a key part of AT’s low-emission vehicle fleet by 2040

### 1.1.4 EB2 and EB3R Project Benefits

The Project will deliver significant benefits to the communities of southeast Auckland and the wider Auckland Region. The Project has been developed in response to transport issues within southeast Auckland, to meet projected population growth, reduce regional greenhouse gas emissions and to achieve modal shift goals.

With regard to the Project area's transport issues, it was previously identified that the Howick Local Board area experiences heavy congestion, with 90,000 vpd using the Panmure and Waipuna Bridges. Recent rapid population growth and a heavy dependence on private vehicles has put significant strain on the existing road network. EB2 and EB3R will help alleviate this congestion. This will principally be achieved through the diversion of traffic from the Ti Rakau Drive / Pakuranga Road intersection and onto the RRF. This diversion will reduce the volumes of through-traffic within Pakuranga Town Centre and local roads. As such, EB2 and EB3R's contribution to congestion reductions will improve travel times, supporting the rapid movement of freight and people.

In addition, the development of the Project has been driven by both previous and projected population growth within southeast Auckland. Pakuranga Town Centre is a major transport hub for southeast Auckland, with traffic flows coming from both established and new suburbs. Ti Rakau Drive and SEART are also important for the efficient movement of freight and goods vehicles, connecting the commercial areas of East Tāmaki, Highbrook, Botany, Pakuranga and Highland Park to the wider region.

The established suburbs, such as Howick and Highland Park are experiencing high levels of redevelopment, through both infill housing and wholesale redevelopment of sites. This redevelopment will only grow in intensity through the new medium density residential standards introduced in late 2021 by the New Zealand Government. Traffic flows from the Auckland Isthmus are also expected to increase given population growth from brownfield developments like the Tāmaki regeneration programme[4]. Large growth is also being generated by greenfield developments like Flat Bush, where 1700 ha of land is being urbanised for a population of 40,000 people. Lastly, congestion due to the growth in commercial activity is also anticipated.

Without the construction of the Project and the provision of improved transport choices (i.e., public and active transport modes), southeast Auckland's road network would experience significantly increased congestion. This would in-turn, impact both the quality of life for residents and the economic wellbeing of Auckland's businesses. The Project will alleviate, in part, increases in road congestion.

The Project will also provide increased transport choices for residents and visitors. The dedicated bus lanes and stations will improve the public transport experience for passengers and make it more attractive to current private vehicle users. Increased uptake of public transport will also ease congestion and reduce greenhouse gas emissions. Similarly, the Project's walking and cycling investments make those transport modes safer and more attractive to users. Lastly, an additional positive effect associated with EB2/EB3R, and the wider Project is improved accessibility.

Therefore, reduced congestion, better public transport, safer walking and new cycling infrastructure will improve the ability for both local residents and visitors to access jobs, education, recreation, housing and healthcare. Given the above, EB2 and EB3R will have significant positive effects for Auckland.

[4] Tāmaki regeneration programme will deliver 10,500 new homes over the next 20 years.

## 1.2 Scope and Purpose of Report

The assessment and consenting phases of the proposed alignment of the Project has been divided into three ‘packages’. The rationale is to aid in obtaining relevant RMA approvals for sections of the Project without potential undue delay to the Project as a whole.

This Integrated Transport Assessment (ITA) assesses the traffic and transportation effects during construction and upon completion of the EB2 and EB3 Residential (EB3R) sections of the Project.

Assessment of the William Roberts Road Extension (WRRE), which will precede EB2 and EB3R, has been provided for in the Early Works resource consent package, but has been taken into account in this assessment as part of the existing environment. Assessment of the EB3 Commercial (EB3C) and EB4 sections of the Project, which will follow after this ITA, will be addressed in a separate report.

The full extent and location of the Project is shown in **Figure 1** below.


**Figure 1: Full project extent and location**[5]

The main elements of EB2 and EB3R include the construction of the RRF, the busway along Ti Rakau Drive from Pakuranga Road to Reeves Road (EB2) and Reeves Road to Gossamer Drive (EB3R) as well as three new bus stations. The general extent and location of these sections of the Project are shown in **Figure 2** below.

[5] https://at.govt.nz/projects-roadworks/eastern-busway/

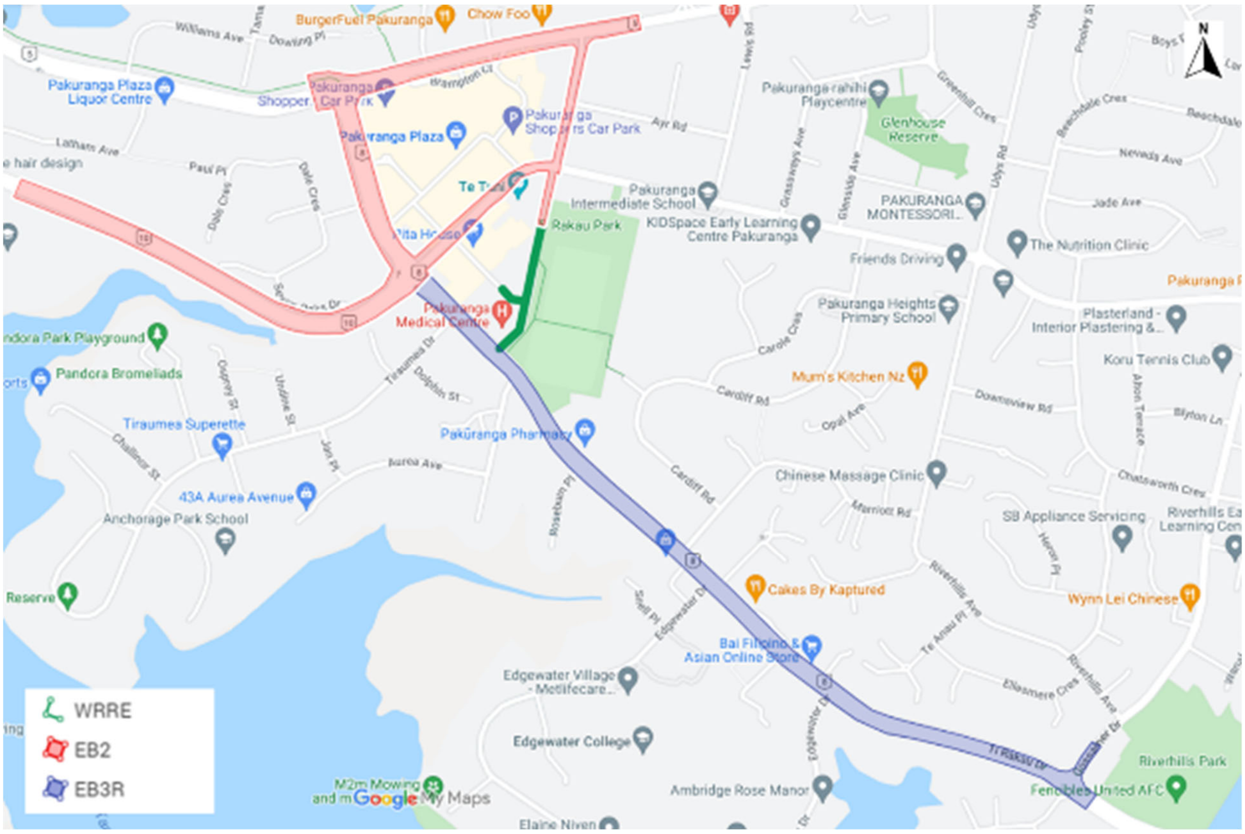



**Figure 2: EB2 and EB3R general extent and location**

The purpose of this report is to:

1. Identify and describe the existing transport environment, including the key issues that the environment faces
2. Describe the potential positive and adverse transport effects of EB2 and EB3R during its construction, in order to highlight the benefits of the Project and to develop mitigation measures as needed
3. Recommend measures (including any conditions/ management plans required); as appropriate to avoid, remedy or mitigate potential traffic and transportation effects including as these relate to effects from construction traffic
4. Present an overall conclusion of the level of potential transport effects of EB2 and EB3R after the recommended measures are implemented

## 1.3 Report Structure

This ITA has been structured as follows:

**Section 2** describes the methodology used to assess the effects of EB2 and EB3R on the transport environment.  This includes EB1, WRRE and other enabling works that will form part of the baseline traffic environment, traffic modelling methodology, public transport, walking and cycling, property access and parking, safety performance and freight traffic.

**Section 3** provides a description of the existing transport environment including land use zoning, the transport network, traffic volumes, travel times, road characteristics, bus services and facilities, walking and cycling facilities, parking, crash environment, over-dimension and over-weight (OD and OW) routes, and changes to the baseline traffic environment for modelling.

**Section 4** provides an overview of the proposed design and construction of EB2 and EB3R.

**Section 5** provides an assessment of the temporary effects of EB2 and EB3R during construction, including construction effects, general traffic, bus services and facilities, pedestrians and cyclists, property access and parking, and safety performance.

**Section 6** provides an assessment of the permanent effects of EB2 and EB3R upon completion, including a description of the future transport network, general traffic, bus services and facilities, pedestrians and cyclists, property access and parking, and safety performance.

**Section 7** provides a summary of the mitigation measures proposed in this ITA.

**Section 8** provides the conclusions from this ITA.

# 2 Assessment Methodology

## 2.1 Introduction

This section describes the methodology used to assess the effects of EB2 and EB3R on the transport environment including:

- A description of the transport environment for assessment (which includes EB1 (Panmure to Pakuranga), WRRE works, and other enabling works)
- Traffic modelling methodology
- Public transport
- Walking and cycling
- Property access and parking
- Safety performance
- Freight traffic

## 2.2 Guidance and Scope

The preparation of this ITA has taken into account the guidance set out in the Auckland Transport (AT) document "*Integrated Transport Assessment Guidelines*" (January 2015) and the Waka Kotahi NZ Transport Agency (Waka Kotahi) document "*Integrated Transport Assessment Guidelines*" (November 2010). This assessment has considered the operational effects of the following areas in the system:

- Road network – general traffic flows and travel time
- Public transport network
- Walking and cycling network
- Property access
- Parking
- Safety performance
- Heavy vehicle routes

## 2.3 Transport Environment for Traffic Modelling Assessment

Auckland's transport networks are constantly changing, undergoing improvements from new initiatives and being optimised. Furthermore, the global COVID-19 pandemic dramatically effected travel patterns and behaviours, and uncertainty remains that these effects would continue into the future. Assessment of the Project against the existing environment was therefore not considered appropriate.

Instead, a more conservative approach was followed whereby a future year scenario was used to compare a 'without Project' and a 'with Project' scenario. Throughout this assessment, the 'without Project' scenario is also referred to as the 'Do-Minimum' scenario, whilst the 'with Project' scenario is also referred to as the 'EB2/EB3R' scenario. The transport models used to simulate the effects of the future year scenarios are listed below:

- Do-Minimum – 2028
- EB2 and EB3R – 2028

Notable major changes to the existing transport network, that were included in the modelling assessments, are detailed below.

#### 2.3.1 Eastern Busway 1 (EB1)

EB1 is a key component of the overall Project. It is the segregated busway connection from Panmure train station to Pakuranga Town Centre. EB1 was completed near the end of 2021 and was included in all 'future year' scenarios.

#### 2.3.2 WRRE Works

This assessment has considered the effects of the WRRE to be undertaken prior to EB2 and EB3R construction. The WRRE includes the extension of William Roberts Road south to Ti Rakau Drive and the completion of the Cortina Place link between William Roberts Road and Reeves Road. WRRE was included in all future year scenarios.

#### 2.3.3 Other EB2 and EB3R Enabling Works

This assessment has also considered the effects of other enabling works to be undertaken during the initial phases of the EB2 and EB3R construction programme, to enable the temporary closure of Reeves Road. The enabling works include geometric and traffic signal timing plan amendments at the Ti Rakau Drive / Reeves Road and Ti Rakau Drive / Gossamer Drive intersections. These enabling works will form part of the EB2 and EB3R consent packages.

### 2.4 Traffic Modelling Methodology

Traffic modelling undertaken of the proposed design of the Project used data cascaded from a number of higher-order, more strategic models provided by the Auckland Forecasting Centre (AFC).

Macro Strategic Model (MSM) Auckland Regional Transport Models (EMME) – These models forecast demands based on Auckland Council's Scenario I Modified Version 11.5 demographic and land use data. The outputs of these models include general traffic demand and public transport demand.

AMETI Regional Traffic Models (EMME) – The outputs of the MSM models were used as inputs into the Regional Traffic Models to generate traffic demands across the region. The outputs of the regional models were then fed into project specific AIMSUN models to allow for a more detailed assessment of traffic effects.

Operational Microsimulation Models (AIMSUN) – These models provide information regarding travel times along different routes within the project area as well as turn movements and traffic demand along roads within the project area. The turning movement outputs from these models were used as inputs into the SIDRA models.

Intersection Models (SIDRA) – These models were used to determine the performance of intersections using traffic movement data from the AIMSUN models. The key outputs include Degree of Saturation (DOS or v/c ratio), delay in seconds, Level of Service (LOS) and queue lengths in metres.

### 2.4.1 Supplied Models

The AIMSUN 2018 Base Model was subjected to various calibration and validation checks to assess the accuracy and suitability of the model. These checks were undertaken with reference to criteria for Category C: Urban Area NZTA Model Development Guidelines (Criteria) on individual link flows, turn flows and travel time for each hour between 07:00 – 09:00 and 16:00-18:00 and is considered acceptably calibrated and validated for the purposes of Eastern Busway design work[6].

Turning movement volumes from the AIMSUN models were used in the SIDRA models to assess intersection performance.

### 2.4.2 Model Outputs

As above, traffic flow outputs (in vehicles per hour) from the AIMSUN models were used as inputs in the SIDRA models to assess intersection performance. AIMSUN models simulate several hours of the network operation during the AM and PM peak periods. The highest 1-hour, in terms of traffic flows, was selected from each period to represent the AM and PM peak hours, respectively.

Traffic flows from these peak hours, produced by AIMSUN, were used to assess intersection performance in SIDRA. As a result, the specific 1-hour period selected for assessment in the various scenarios may differ slightly.

Another key AIMSUN model output considered during this ITA was travel time. Route travel times were determined along various routes through the Project areas for the Do-Minimum and EB2/EB3R scenarios. The effects of EB2 and EB3R were determined by comparing these scenarios in each direction, for the AM and PM peak periods.

Key SIDRA outputs considered during this ITA included Level of Service (LOS), Degree of Saturation (DOS) or v/c ratio, and delay in seconds.

### 2.4.3 Traffic Demand

The traffic demand data, cascaded down from the various models as detailed above and used in the SIDRA models, represent an average weekday's traffic demand in the AM and PM peak hours. Interpeak periods and weekends were determined to generally have lower traffic activity and congestion compared to weekdays, so explicitly modelling these periods was not considered necessary to understand the effects and outcomes of the Project.

[6] Eastern Busway – Base 2018 Model Update Report, BECA, February 2019

### 2.4.4 Assumptions

Below are the key assumptions used in the modelled transport environments.

#### *2.4.4.1 MSM Assumptions*

- Auckland Council's Scenario I Modified Version 11.5
- All relevant projects that have been identified in the ATAP plan delivery 2021 – 2031 were included in the MSM version 11.5. Notable projects that may influence the demand of the movement of people around the Project include:
    - Airport to Botany interim bus improvements
    - Sylvia Park bus improvements
    - Connected Communities (Pakuranga Road)
    - City Rail Link
- Eastern Busway 1 Panmure to Pakuranga was included in the future Do-Minimum, 2028 and 2048 scenarios

#### *2.4.4.2 AIMSUN Assumptions*

- Similarly, relevant and notable projects were included in the AIMSUN models

#### *2.4.4.3 SIDRA Assumptions*

- Where turning movement volumes were <10 veh/h, a minimum of 10 veh/h was adopted
- Rather than being random, bus arrivals at intersections were set to Arrival Type 6 on all busway lanes. This means a high percentage of arrivals occur during the green phases, which was used to simulate Traffic Signal Priority for buses
- Free flow speeds along Ti Rakau Drive were assumed from the free-flow speeds provided by the MSM modelling. The following speeds were assumed for the various other streets:
    - Side streets – 50 km/h
    - William Roberts Road - 30km/h
    - Entrances (i.e., to the mall) – 20 km/h
    - Along busways – 50 km/h
- Saturation flow rate was left at the SIDRA default Basic Saturation Flow of 1950 tcu/h per lane
- Where the approach/ intersection was modified, lanes widths for general vehicle lanes and bus lanes were taken as 3.2 m and 3.5 m, respectively

## 2.5 Public Transport, Walking and Cycling

### 2.5.1 Public Transport

The effects on the public transport network focused on the following aspects:

- Direct effects on bus routes and bus stops
- Effects on travel times of buses through the Project area

### 2.5.2 Walking and Cycling

The assessment considered the potential effects of EB2 and EB3R on pedestrians and cyclists. This was primarily via a qualitative assessment of changes in the type and quality of connections and facilities provided.

## 2.6 Property Access and Parking

### 2.6.1 Property Access

The assessment considered the potential effects of changes in property access. Local access effects were assessed in terms of extra travel time and distance as well as safety.

### 2.6.2 Parking

This included assessment of the potential physical effect of reducing properties' on-site parking spaces, as well as any on-street parking that may be affected by the proposed design.

## 2.7 Safety Performance

A Safe System Assessment (SSA) was undertaken for the Project, which provides a comprehensive assessment of the existing crash environment and the potential future environment.

The safety performance assessment considered the effects of the proposed design on existing roads, new roads and vulnerable users.

## 2.8 Freight Traffic

It is recognised that cars and trucks generally have the same travel times in congested urban networks and therefore the same methodology described in **Section 2.4.2** was used to assess the effect of the Project on freight traffic and direct effects to heavy vehicle routes.

# 3 Existing Transport Environment

This section provides a description of the existing transport environment, including the following:

- A description of the existing problems and challenges
- Land use zoning
- Existing transport network
- Traffic volumes
- Travel times
- Road characteristics
- Bus services and facilities
- Walking and cycling facilities
- Parking
- Crash environment
- Over-dimension and over-weight (OD and OW) routes
- Changes to the baseline traffic environment

## 3.1 Description of the Existing Problems and Challenges

In 2016, AT, Waka Kotahi and Auckland Council agreed the following key problems in the AMETI Project area for the AMETI programme, including the Eastern Busway, to address:

- **Problem 1** – Lack of connections in the transport network creates congestion and unreliable travel times for people accessing employment and other destinations

- **Problem 2** – Lack of travel choices and reliance on private cars is resulting in congestion, lack of access to opportunities and poor environmental outcomes

- **Problem 3** – Provision of transport capacity and options has not kept pace with land use development resulting in congestion and inefficient use of transport corridors

- **Problem 4** – Poorly integrated land use and transport design is limiting accessibility, creating poor places and discouraging economic development

- **Problem 5** – Development and operation of the road network has prioritised the efficient movement of vehicles ahead of safety resulting in too many people dying or being seriously injures, especially vulnerable users

The Project will seek to address these problems through a range of improvements to existing infrastructure as well as new infrastructure.

## 3.2 Land Use Zoning

The Project area is located in East Auckland and bordered by Pakuranga Town Centre in the northwest and Botany Town Centre in the southeast. Major industrial and commercial areas in East Tāmaki are situated to the west and south which play an important role in providing employment opportunities to the residents in the vicinity of the Project. These employment zones include Panmure, Mt Wellington, Penrose/ Onehunga and Highbrook/ East Tāmaki.

The local land uses comprise of medium density/ single dwelling residential lots with retail-based town centres, local shops, commercial activities and industrial blocks. These areas are currently connected to the Project area by either direct property access or near-direct access via side roads. The Project will also have a through-function and will serve movements between and beyond the fringes of the project area, including links to Panmure, Mt Wellington, Flat Bush and Manukau.

Notable features of the existing land use and environment include:

**Business Land Uses of Interest:**

- Pakuranga Plaza
- GAS Pakuranga Road service station
- Gull Reeves Road service station
- Tai Ping Supermarket
- Eastside Pups Dog Grooming and Daycare
- Edgewater Shops

**Residential and Community Land Uses of Interest:**

- Pakuranga Library and Citizens Advice Bureau
- Te Tuhi Art Gallery
- Pakuranga Mosque
- Ti Rakau Park
- Pakuranga Leisure Centre
- Dementia Auckland
- Pakuranga Medical Centre
- Pakuranga Counselling Centre
- Pakuranga Baptist Church
- River Hills Park (Fencibles United Football Club)

**Schools and Education Land Uses of Interest:**

- Saint Kentigern College
- Barnardos Early Learning Centre
- Pakuranga Intermediate School
- KIDSpace Early Learning Centre Pakuranga
- Pakuranga Kindergarten
- Edgewater College
- Pakuranga Baptist Church and Kindergarten

**Figure 3** shows the surrounding area zoning of EB2 and EB3R in the Auckland Unitary Plan (Operative in Part) (AUP(OP)), in the existing environment.

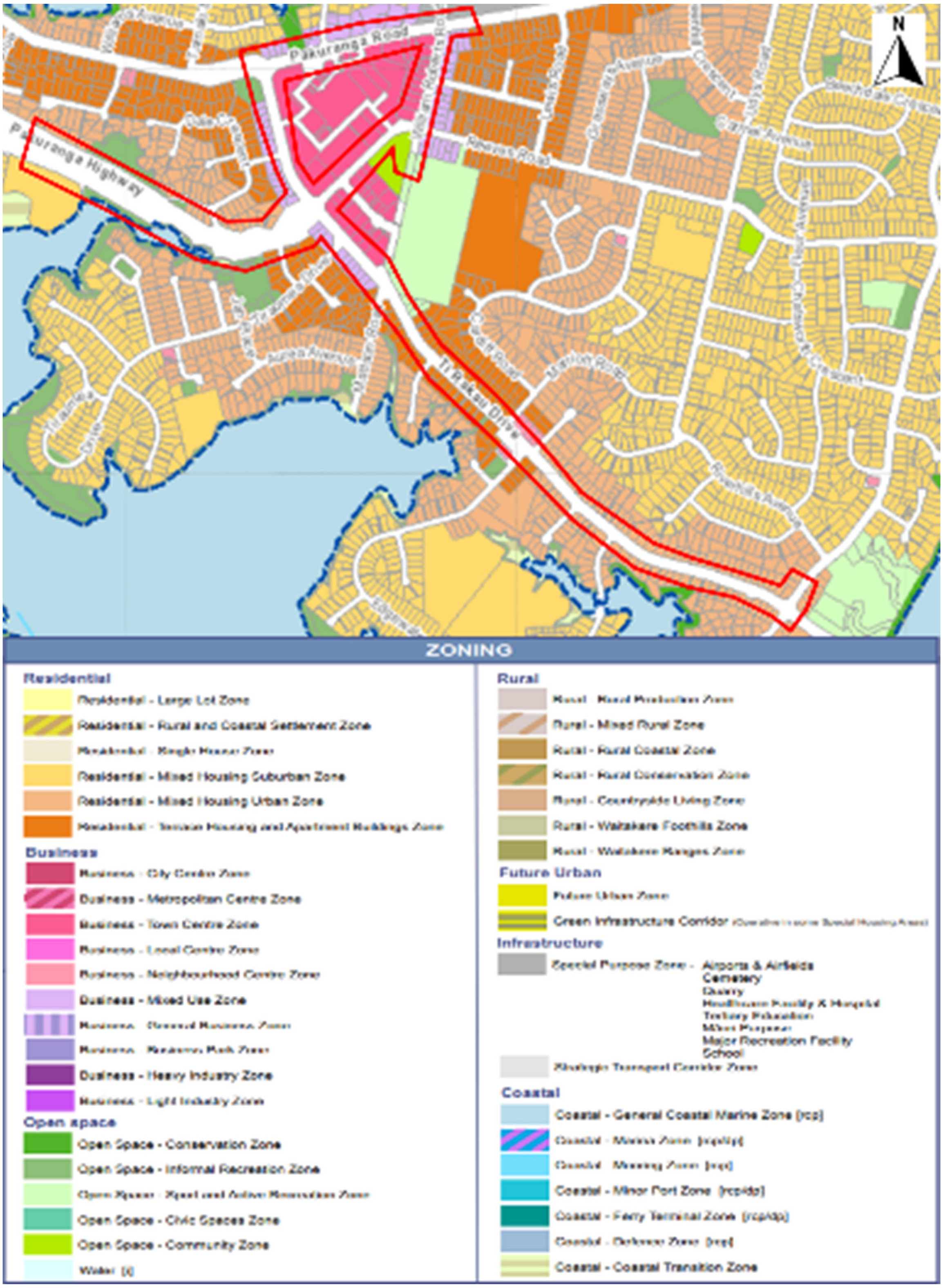



**Figure 3: Existing EB2 and EB3R zoning (source: Auckland Council GIS)**

## 3.3 Existing Transport Network

In order to align with AT's and Auckland Council's desire to consistently identify the different functions of roads and streets in Auckland, the EBA has adopted the Roads and Streets Framework (RASF) by using concepts of 'Place' and 'Movement' to reflect the strategic role of streets.

The RASF provides a systematic and consistent methodology for identifying the Place and Movement functions of roads and streets. In doing this, it reflects the needs and catchment of the adjoining land use as well as the movement of people, goods and services. A full RASF assessment was completed for the Project[7] and the section below summarises the key aspects of the existing transport network and modal priority in the EB2 and EB3R project areas.

**Figure 4** shows the RASF typology matrix as a function of Movement and Place significance.

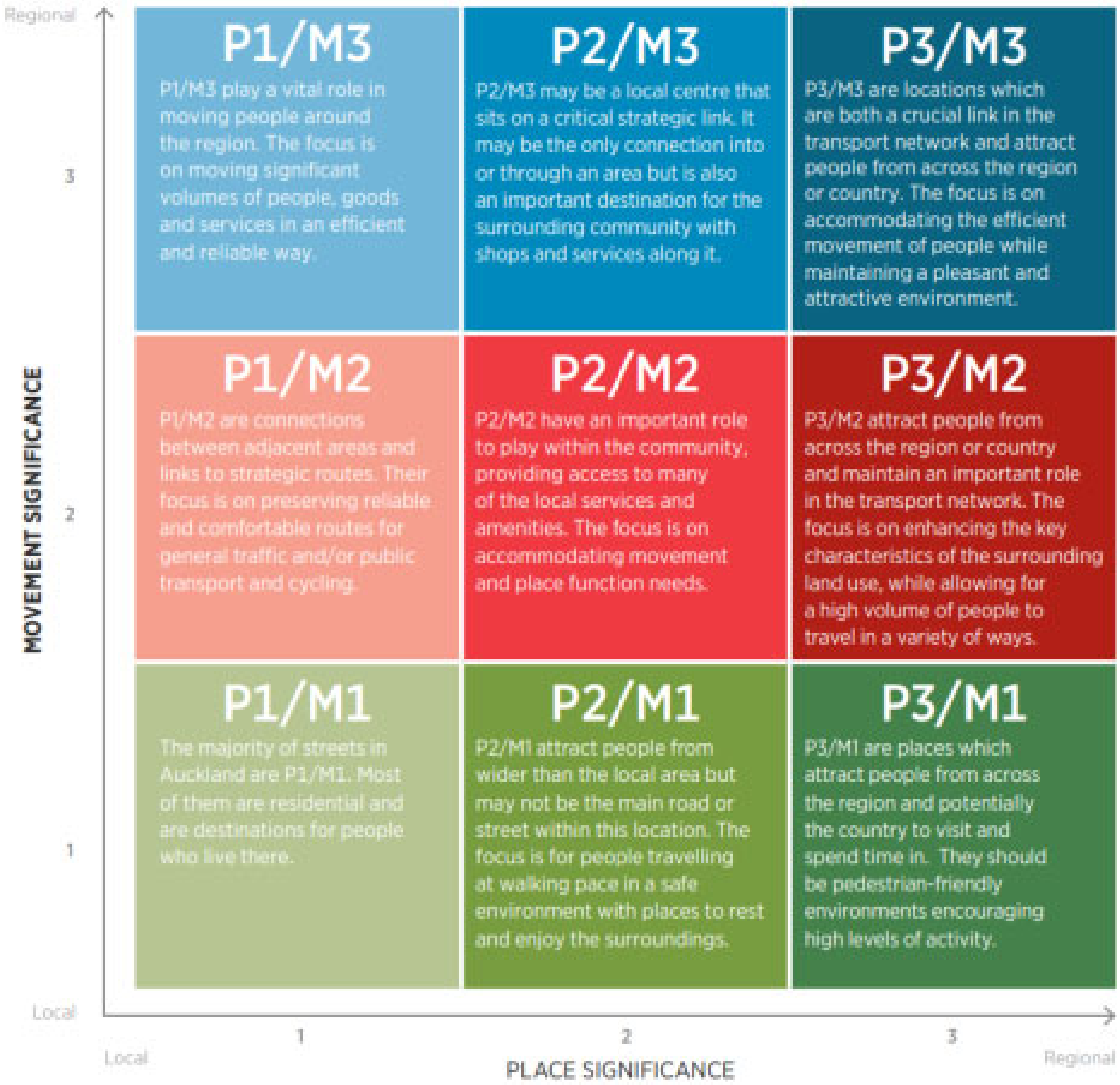



**Figure 4: RASF typology matrix**

**Figure 5** outlines the current typology of the EB2 and EB3R project areas.

[7] EB234-1-TE-RP-Z0-A2-Roads and Street Framework

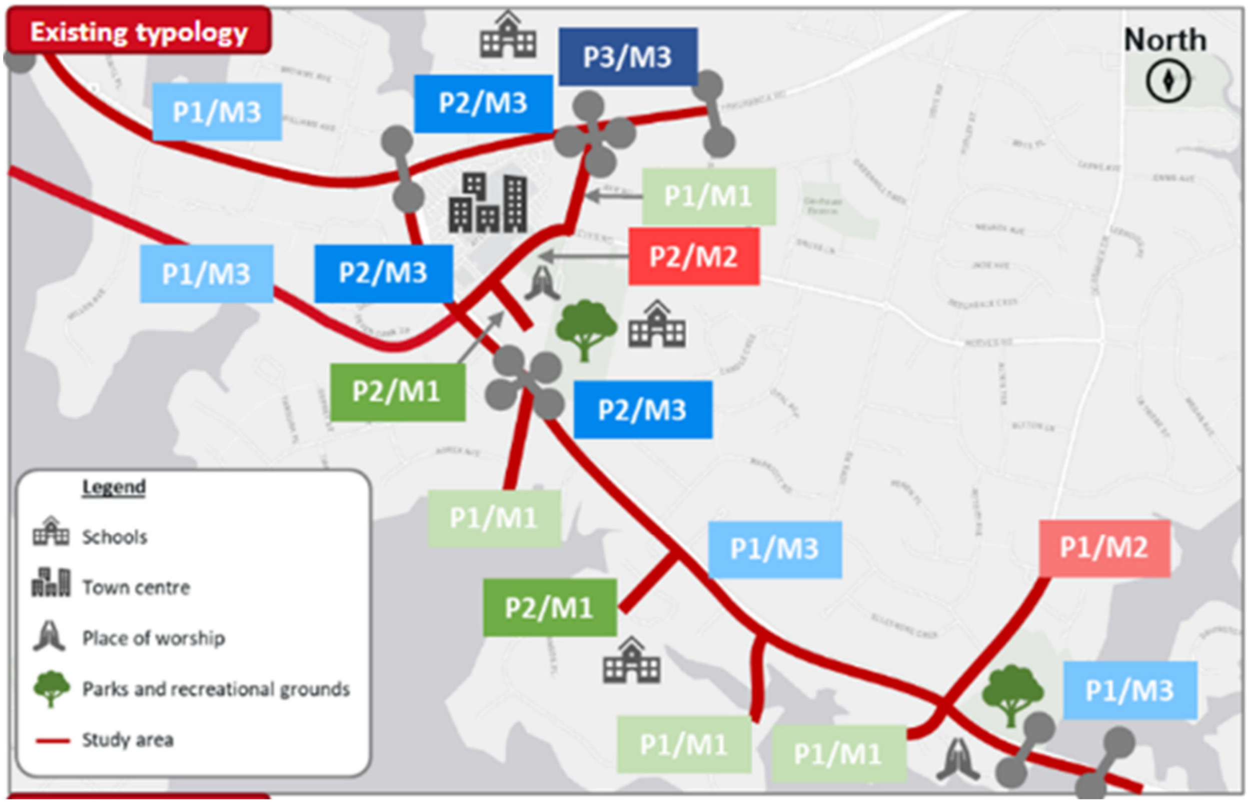



**Figure 5: Existing EB2 and EB3R typology**

Pakuranga Road is an east-west primary/ regional arterial, which connects Howick/Highland Park with Panmure via Pakuranga. It also intersects with Ti Rakau Drive, providing an arterial route towards Botany Town Centre and East Tāmaki. Pakuranga Road carries approximately 40,000 vehicles a day, as well as frequent bus services. The objective of this corridor is to move significant volumes of people, goods and services and as such, it has a typology of 'M3' classification.

The majority of land use along Pakuranga Road, west of the town centre, is residential. East of the town centre there are some retail properties along Pakuranga Road. However, these properties generally have a large setback between the footpath and the properties due to car parking spaces. As a result, the primary function of this corridor is Movement.

Ti Rakau Drive is a regionally significant corridor connecting Pakuranga with Botany. Along Ti Rakau Drive there are major employment sites such as Pakuranga Town Centre, Botany Town Centre, and East Tāmaki industrial zones. The section of Ti Rakau Drive east of SEART is a level 1B freight route. Frequent bus services also operate along this section. Given these factors, the primary function of this corridor is also Movement, and it also has a typology of 'M3' classification.

A trend is observed whereby Movement is largely prioritised over Place, especially along Ti Rakau Drive. The Project seeks to improve this, particularly at the proposed locations of the new bus stations.

## 3.4 Traffic Volumes, Travel Time and Road Characteristics

### 3.4.1 Traffic Volumes

The existing environment traffic volumes were determined predominantly using traffic data from 2017. In 2020/2021, COVID-19 dramatically affected the way people travelled and so these years would not accurately reflect the volumes of traffic expected on the road network. It was anticipated that data from 2019 would be the most accurate, however, it was determined that this data set was incomplete and would likely produce inaccurate results.

Data from 2017 was the most complete data set available from the previous life cycle of the AMETI EB2&3 specimen design. Although traffic volumes are expected to have grown marginally between 2017 and 2019, it is not expected that this growth would be significant, and the 2017 data is still considered relevant.

**Table 2** shows the Average Annual Daily Traffic (AADT) volumes in the existing environment in the EB2 and EB3R project areas as well as the anticipated daily volumes for the 2028 and 2048 future years, without the Project. A conservative approach was followed to produce the 2028 and 2048 future year AADTs, by not including the effects of COVID-19. The purpose of this table is to provide context for a more detailed comparison of the future years.

**Table 2: Existing[8] and future[9] AADT (without project)**

| Road Section | Direction | Existing AADT | 2028 without project | 2048 without project |
|---|---|---|---|---|
| **Ti Rakau Drive** | | | | |
| Pakuranga Rd – Reeves Rd | Westbound | 19,400 | 20,700 | 20,700 |
| | Eastbound | 14,800 | 17,400 | 17,400 |
| Reeves Rd – Tiraumea Dr | Westbound | 19,500 | 18,000 | 18,700 |
| | Eastbound | 17,300 | 16,600 | 18,200 |
| Tiraumea Dr – Mattson Rd | Westbound | 21,300 | 17,300 | 18,000 |
| | Eastbound | 18,800 | 16,600 | 18,200 |
| Mattson Rd – Marriot Rd | Westbound | 21,100 | 17,400 | 18,100 |
| | Eastbound | 17,900 | 16,100 | 17,700 |
| Marriot Rd – Edgewater Dr West | Westbound | 20,000 | 17,800 | 18,400 |
| | Eastbound | 17,900 | 16,400 | 17,800 |
| Edgewater Dr West – Edgewater Dr East | Westbound | 19,800 | 16,900 | 17,600 |
| | Eastbound | 17,500 | 15,600 | 17,200 |
| Edgewater Dr East – Gossamer Dr | Westbound | 19,700 | 16,600 | 17,400 |
| | Eastbound | 18,000 | 15,300 | 17,200 |

[8] The majority of the existing volumes were sourced from 2017 SCATS data, however where this data was not available a mixture of RAMM, ONRC, and the most recent AT traffic counts have been reported.

[9] 2028 and 2048 future year demand was determined from the EMME models

| Road Section | Direction | Existing AADT | 2028 without project | 2048 without project |
|---|---|---|---|---|
| **Side Roads** | | | | |
| Pakuranga Rd | Westbound | 17,900 | 18,500 | 17,600 |
| | Eastbound | 16,000 | 20,000 | 19,400 |
| SEART | Off-Ramp | 27,400 | 26,200 | 27,900 |
| | On-Ramp | 27,000 | 29,900 | 30,600 |
| Tiraumea Dr[10] | Exit | 1,230 | 2,800 | 2,830 |
| | Enter | 410 | 2,600 | 2,620 |
| William Roberts Rd[11] | Northbound | 380 | 550 | 540 |
| | Southbound | 2,410 | 5,700 | 5,700 |
| Reeves Rd | Exit | 6,700 | 9,500 | 10,000 |
| | Enter | 6,600 | 4,100 | 4,400 |
| Mattson Rd[12] | Exit | 1,000 | 1,700 | 1,600 |
| | Enter | 1,600 | 2,300 | 2,300 |
| Marriot Rd[13] | Exit | 1,160 | 840 | 840 |
| | Enter | 1,090 | 950 | 1,000 |
| Edgewater Dr West | Exit | 1,500 | 1,800 | 1,900 |
| | Enter | 1,200 | 1,900 | 2,000 |
| Fremantle Pl | Exit | 400 | 520 | 530 |
| | Enter | 400 | 480 | 480 |
| Gossamer Dr | Exit | 7,200 | 1,2200 | 12,800 |
| | Enter | 5,800 | 8,800 | 10,000 |

It should be noted that no data was available for Cortina Place. This table provides useful context, however a more detailed comparison of future years 'without and with the Project' is discussed in **Section 5** and **Section 6** of this report.

[10] 2018 RAMM data used.
[11] Assumed 50/50 Split of volumes enter and exit.
[12] 2018 RAMM data used.
[13] 2028 design volume ratios used to determine volumes in each direction.

Large increases in traffic demand are predicted on Ti Rakau Drive between Pakuranga Road and Reeves Road in the 2028 future year, with no increases by 2048. With this section of the corridor near or at full capacity, especially at the Ti Rakau Drive / Reeves Road / SEART intersection, a trend is observed where traffic demand on Ti Rakau Drive to the east of the intersection is expected to remain roughly unchanged or in some cases decrease. This is likely due to large increases in queues and delays, acting as a bottle neck for the rest of the corridor, forcing vehicles to reroute to less congested links.

This trend is also observed on Pakuranga Road. An increase in traffic demand is predicted by 2028, with a decrease by 2048. In the existing environment, motorists travel along Pakuranga Road and turn left onto Ti Rakau Drive to head towards SEART. With this section of Ti Rakau Drive at capacity, large increases in queues and delays are likely. This in turn is expected to lead to rerouting to occur to less congested links.

**Figure 6** shows the AADT volumes in the existing environment in a network context.

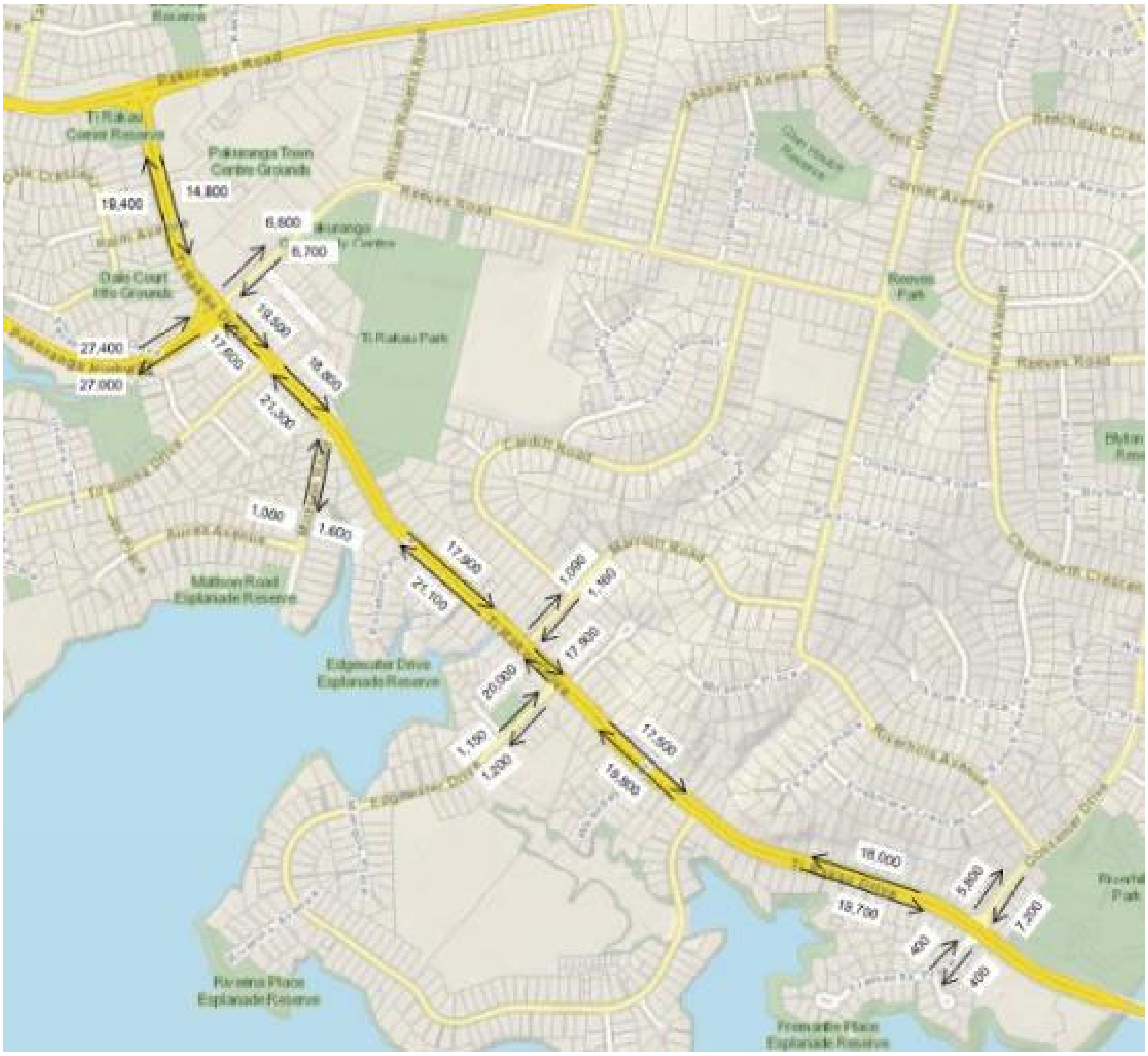


**Figure 6: Existing environment AADT**

### 3.4.2 Travel Time and Variability

Route travel times and variability in the existing environment were determined from the AIMSUN 2018 Base Model. The AM peak hour was recorded between 07:30-08:30 and the PM peak hour between 16:30-17:30. To maintain consistency across the different assessments already conducted and future ITAs, four routes were selected to determine the travel time of general traffic in the existing environment. These routes are outlined below, and the results are shown in **Table 3**:

- Botany to Pakuranga (Ti Rakau Drive / Chapel Road intersection to Pakuranga Road / Williams Avenue intersection) – both directions
- Botany to SEART (Ti Rakau Drive / Te Irirangi Drive intersection to the western abutment on Waipuna Bridge) – both directions
- Howick to Pakuranga (Pakuranga Road / Glenmore Road intersection to Pakuranga Road / Williams Avenue intersection) – both directions
- Howick to SEART (Pakuranga Road / Glenmore Road intersection to the western abutment on Waipuna Bridge) – both directions

**Table 3: Base model (2018) general traffic travel times**

| AM Peak | | | | | | |
|---|---|---|---|---|---|---|
| | Westbound | | | Eastbound | | |
| **Route** | **Base Model 2018 [min]** | **Variability + [min]** | **Variability – [min]** | **Base Model 2018 [min]** | **Variability + [min]** | **Variability – [min]** |
| Botany - Pakuranga | 17.4 | 2.0 | -1.7 | 11.7 | 0.3 | -0.4 |
| Botany - SEART | 10.7 | 1.6 | -0.9 | 9.4 | 0.9 | -0.7 |
| Howick - Pakuranga | 3.1 | 0.1 | -0.1 | 3.3 | 0.2 | -0.1 |
| Howick - SEART | 12.0 | 0.4 | -0.5 | 6.9 | 0.5 | -0.4 |
| **PM Peak** | | | | | | |
| | Westbound | | | Eastbound | | |
| **Route** | **Base Model 2018 [min]** | **Variability + [min]** | **Variability – [min]** | **Base Model 2018 [min]** | **Variability + [min]** | **Variability – [min]** |
| Botany – Pakuranga | 26.1 | 0.8 | -1.1 | 16.0 | 0.8 | -1.2 |
| Botany - SEART | 18.5 | 0.6 | -0.9 | 9.3 | 0.6 | -0.6 |
| Howick - Pakuranga | 2.9 | 0.1 | -0.1 | 5.6 | 0.6 | -0.5 |
| Howick - SEART | 4.5 | 0.1 | -0.2 | 9.2 | 0.2 | -0.1 |

In the AIMSUN model, the routes from Botany to Pakuranga and Botany to SEART travel along the same section of Ti Rakau Drive, up to Reeves Road. Therefore, these routes have the same travel time along this section of the corridor.

However, from the Ti Rakau Drive / Reeves Road / SEART intersection, the Botany to Pakuranga route heads towards the Williams Avenue intersection, a distance of roughly 780 m. Meanwhile, the Botany to SEART route extends up to the western abutment of the Waipuna Bridge, a distance of roughly 1.4 km.

Although the Botany to Pakuranga Road route passes through three more intersections compared to the Botany to SEART route, its travel time is significantly longer. This is particular evident in the peak directions, westbound in the AM peak period and eastbound in the PM peak period. This is likely due to congestion on Ti Rakau Drive between Pakuranga Road and Reeves Road, leading to large queues and delays.

This trend is also observed in the Howick to Pakuranga and Howick to SEART routes. The two routes from Howick travel along the same section of Pakuranga Road, from Glenmore Road up to Ti Rakau Drive and will have the same travel times along this section. However, a significant increase in travel time is expected in the Howick to SEART route. Although the distance from the Pakuranga Road / Ti Rakau Drive intersection to the Waipuna Bridge is further than the distance to the Williams Avenue intersection, it is likely that congestion on Ti Rakau Drive is contributing to the large travel times.

### 3.4.3 Road Characteristics

The traffic data for Ti Rakau Drive demonstrated a tidal flow characteristic where westbound traffic movements (citybound) are dominant in the morning period and eastbound traffic volumes (outbound) are dominant in the evening period.

**Figure 7** shows the existing directional signage on Ti Rakau Drive, upstream of Reeves Road / SEART intersection, westbound and eastbound, respectively.


**Figure 7: Existing directional signage on Ti Rakau Dr westbound and eastbound, respectively**

A raised median on Ti Rakau Drive between Pakuranga Road and Reeves Road prevents right-turn movements, except at Palm Avenue. Aylesbury Street has two accesses points onto Ti Rakau Drive with varying movement restrictions. A U-turn facility is provided on Ti Rakau Drive approximately 50 m south of the intersection with Pakuranga Road. This section of Ti Rakau Drive consists of three lanes in each direction.

A similar restriction currently exists on Ti Rakau Drive between Reeves Road and Mattson Road, preventing right-turn movements out of Tiraumea Drive and all properties fronting this section of Ti Rakau Drive. Three lanes westbound and two lanes eastbound are provided for the majority of this section.

The raised median continues from Mattson Road to Gossamer Drive, preventing right-turns out of properties fronting Ti Rakau Drive. However, full turning movements are provided at all intersections along this section of the corridor. Ti Rakau Drive has a 60 km/h posted speed limit in the existing environment.

## 3.5 Bus Services and Facilities

In December 2017, AT launched a new bus network for East Auckland. This launch included a new bus network, bus routes, route numbers, timetables and buses. The new East Auckland Bus Network philosophy was improved integration with other public transport networks for Auckland, such as buses connecting with trains at the Panmure and Otahuhu interchanges, as well as at the Middlemore, Papatoetoe and Manukau train stations. **Figure 8** outlines the existing bus routes operating in the EB2 and EB3R project areas.

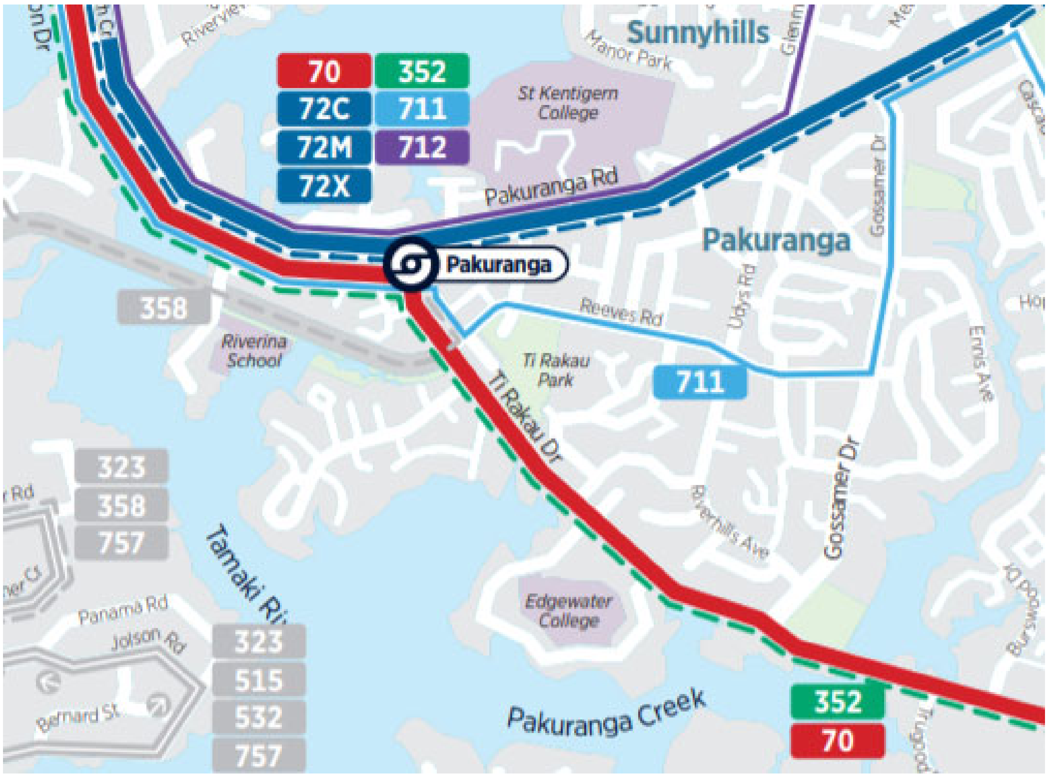



**Figure 8: Existing bus network through EB2 and EB3R project areas**[14]

[14] https://at.govt.nz/media/1974487/east-new-network-get-ready-poster-aug17-v30.pdf

There are a number of routes within the EB2 and EB3R project areas that currently operate on the proposed Eastern Busway corridor. These routes are the 70, 72C, 72M, 72X, 352, 711, 712. School bus services operating in the EB2 and EB3R project areas include the following:

- S415 – Pakuranga to Sacred Heart College
- S416 – Botany Downs to Sacred Heart College
- S440 – Bucklands Beach to Sancta Maria College
- S013 – Otara to Edgewater College
- S073 – Otahuhu to Edgewater College

Details of the general routes are outlined in **Table 4** below.

**Table 4: Existing bus services through EB2 and EB3R project areas**

| Route Type | Route No | Frequency | Description |
|---|---|---|---|
| Frequent Services | 70 | Every 15 minutes | Botany, Pakuranga, Panmure, Ellerslie, Newmarket, City |
| | 72C/M | Every 15 minutes | Howick, Pakuranga Rd, Pakuranga, Panmure |
| Connector Services | 711 | Varying | Howick, Cook St, Union Rd, Bradbury Rd, Cascades Rd, Reeves Rd, Panmure |
| | 712 | Varying | Bucklands Beach, Casuarina Rd, Glenmore Rd, Panmure |
| Peak Period Services | 72X | Services operate weekdays only, during morning and afternoon peaks | Botany, Howick, Pakuranga, Panmure, Southern Motorway, City |
| | 352 | Services operate weekdays only, during morning and afternoon peaks | Panmure, Highbrook, East Tāmaki, Manukau |

In the existing environment, the 70, 352 and 711 services travel along Ti Rakau Drive and the 72C, 72M, 72X and 712 services travel along Pakuranga Road in the kerbside lanes with general traffic. As such, buses have roughly the same travel times as general vehicles along these sections (excluding dwelling time at bus stops) and experience the same delays at intersections. Furthermore, without the Project, buses are expected to experience the same increases in delays in the future as a result of congestion and queueing on Ti Rakau Drive and Pakuranga Road.

There are approximately 18 bus stops within the EB2 and EB3R project areas, which include 10 on Ti Rakau Drive. **Figure 9** below shows the existing bus stop locations, the stops are mainly for public bus services.

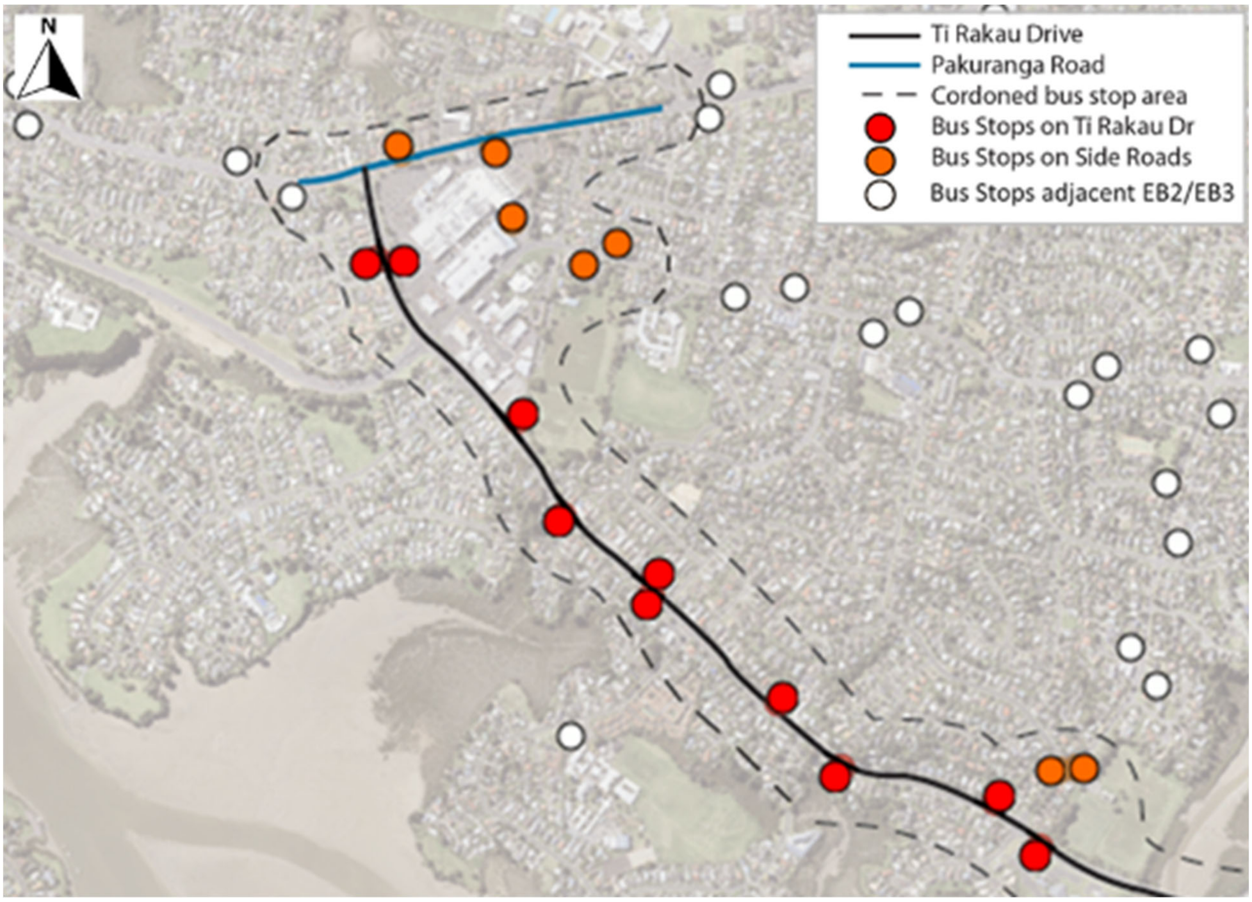



**Figure 9: Existing bus stops within the EB2 and EB3R project areas**

The spacing between bus stops varies between 200m and 1.5km with the average distance between stops being 500m. The walking catchments for these bus stops show that there are some significant gaps in the walking network over large areas, particularly along Ti Rakau Drive, based on a nominal 400m radius isochrone walking catchment.

There are also locations of considerable overlap in the bus stop catchments suggesting that stop locations may not be optimised. All existing bus stops are on-street, with the exception of off-street stops at Pakuranga Town Centre. The majority of the existing bus stops on Ti Rakau Drive and Pakuranga Road do not provide seating and sheltered cover. No bicycle parking is provided in the existing environment.

## 3.6 Walking and Cycling Facilities

### 3.6.1 Walking Facilities

Overall, pedestrian footpaths are provided along both sides of the majority of roads within the Project area in the existing environment. However, there is an absence of pedestrian facilities particularly along William Roberts Road south, and some slip lanes do not provide signalised pedestrian crossings. Various side roads intersecting Ti Rakau Drive do not have crossings facilities currently.

#### *3.6.1.1 EB2 – Ti Rakau Drive (Pakuranga Road to Reeves Road)*

- A pedestrian footpath is available on both sides of the road, approximately 1.5 m wide and separated from the live lane by a 1.0 m grass berm
- The only crossing facilities are at the two signalised intersections of Pakuranga Road / Ti Rakau Drive and Ti Rakau Drive / Reeves Road
- No mid-block crossing is available between the two intersections. The road is also separated by a median grass berm. From observation, pedestrians are finding gaps in traffic and utilise the median as a refuge area, waiting for a gap to cross to Pakuranga Plaza

#### *3.6.1.2 EB2 – Pakuranga Road (Ti Rakau Drive to William Roberts Road)*

- A pedestrian footpath is provided on both sides of the corridor, approximately 1.2 m wide on the northern side with a 1.5 m grass berm (no grass berm to the east of the Brampton Court access to the Pakuranga Plaza). The footpath is approximately 1.7 m wide on the southern side with a 0.6 m grass berm
- Crossing facilities are only provided at the Pakuranga Road / Ti Rakau Drive intersection and the signalised mid-block crossing near the Pepler Street exit at the Pakuranga Plaza. The westbound and eastbound carriageways are separated by a 3.0 m flush median
- A pedestrian refuge island is provided across William Roberts Road at its intersection with Pakuranga Road, however, no crossing facility is provided across Pakuranga Road at this location

#### *3.6.1.3 EB2 – Reeves Road*

- Footpaths are currently provided along both sides of Reeves Road, approximately 1.5m in width and separated from the live lanes by a 1.2 m grass berm
- Crossing facilities are provided at the Ti Rakau Drive / Reeves Road / SEART intersection and at the mid-block pedestrian crossing. A pedestrian refuge island is provided across William Roberts Road north at its intersection with Reeves Road, however, no crossing facility across Reeves Road is provided at this intersection

#### 3.6.1.4 EB2 – William Roberts Road

- Currently, footpaths are available on both sides of William Roberts Road north (approximately 1.5 m wide), however, a grass berm of approximately 1.2 m width is only provided on the eastern side

- Pedestrian refuge islands are provided at the north end at Pakuranga Road and at the southern end at Reeves Road

- William Roberts Road south currently has no pedestrian footpaths on either side of the carriageway, except for a short section on the western side near the Pakuranga Community Centre

- No pedestrian facilities are currently provided to cross William Roberts Road south

#### 3.6.1.5 Cortina Place

- Footpaths are currently provided on both sides of Cortina Place, approximately 1.7 m wide and no grass berm

- A pedestrian refuge island is provided near the intersection with Reeves Road, and 2.9 m grass median is provided along the majority of the road

#### 3.6.1.6 EB3R – Ti Rakau Drive (Reeves Road to Gossamer Drive)

- On average, the footpath width is 1.5 m and is separated from the road carriageway and high volumes of fast-moving traffic by a 1.0 m grass berm
- Patches of the pedestrian path is encroached with tree branches, leaves and shrubs from the property side of the footpath reducing the width of the footpath, but generally the path itself is in good physical condition
- The Ti Rakau Drive residential area supports low to medium density housing with a number of cul-de-sacs, as well as local schools and parks. Footpath facilities enable pedestrian movements along Ti Rakau Drive, but there are no additional links between cul-de-sacs
- There is one access into Ti Rakau Park from Ti Rakau Drive itself, near the intersection with Mattson Road. Limited links and connections indicate poor pedestrian connectivity and access to the parks and schools in the surrounding area
- There are four crossing facilities to accommodate crossing the corridor in the residential section, located at the four signalised intersections:
    - Ti Rakau Drive / Reeves Road
    - Ti Rakau Drive / Mattson Road
    - Ti Rakau Drive / Edgewater Drive
    - Ti Rakau Drive / Gossamer Drive
- The intersections are of similar design along the route, which consist of left-turn slip lanes for vehicle efficiency and crossing facilities provided across the side street and one leg of the corridor. Pedestrians must cross the slip lanes, unprotected, to the refuge island before arriving at the push button to cross the road. Additionally, pedestrians can only cross at one side of the intersections on Ti Rakau Drive, reducing the pedestrian amenity and efficiency

### 3.6.2 Cycling Facilities

There is an absence of cycle facilities along the vast majority of Ti Rakau Drive. Neither on-road nor off-road cycle facilities are provided to encourage movement along Ti Rakau Drive, except at the Ti Rakau Drive / Gossamer Drive intersection.

Cyclists within the EB2 and EB3R project areas must currently share an on-road lane with high-volume, high-speed traffic, as well as with heavy vehicles (e.g., buses). Crossing facilities are limited to those at signalised intersections. More experienced and confident cyclists who mix with general traffic have the choice to cross at intersections from right turning bays, but must still cross multiple lanes of traffic to do so. Furthermore, cyclists must navigate numerous driveways along the corridor.

In the wider Pakuranga area, there are sections of short cycle routes, outlined in **Figure 10**. Reeves Road is suggested as a road with space for cyclists, albeit with high traffic demand. AT recently developed recreational cycle facilities in the eastern cycle network, such as the Cascades shared path that connects Pakuranga College, Burswood Drive and Meadowlands. AT has also developed the Pakuranga Rotary shared path that tracks the coastline of the Tāmaki River. Additional recreational cycle routes provide connection to and from Half Moon Bay Ferry Terminal, Farm Cove, Sunny Hills, and Pakuranga Plaza. With the completion of EB1, a bi-directional cycleway and shared path is located on the northern side of Pakuranga Road from Ireland Road to Ti Rakau Drive.

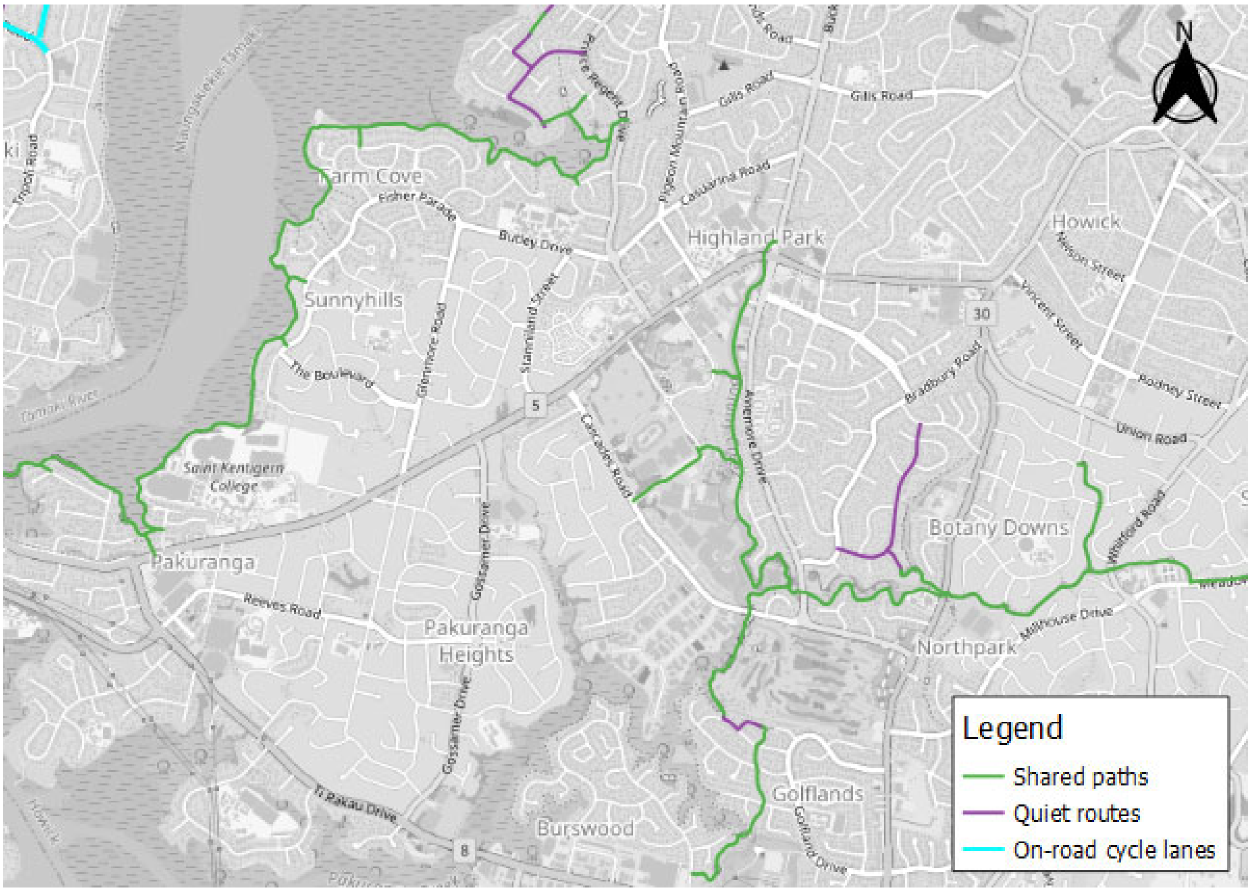



**Figure 10: Existing cycle routes and facilities in the wider Pakuranga area**

## 3.7 Parking

Within the EB2 and EB3R project areas there are a number of locations that offer parking, both on-street and off-street. The key locations in the EB2 and EB3R project areas are:

- Pakuranga Plaza
- Te Tuhi
- Ti Rakau Park
- Cortina Place
- William Roberts Road
- Ti Rakau Drive
- Edgewater shops
- Side roads

Currently, Pakuranga Plaza is classified as a Business Town Centre Zone. Under the AUP(OP), there are generally no upper limits on the amount of parking retail, office, education facilities, hospitals and commercial services can provide.

Parking surveys were conducted to determine the utilisation of the existing on-street and off-street parking demand and utilisation in the EB2 and EB3R project areas. **Figure 11** shows the surveyed areas, which were surveyed on Thursday 5 July 2018 and Saturday 7 July 2018. At the time of data collection, these survey dates were selected to represent typical weekday and weekend periods of parking utilisation at the selected sites. These data sets exclude the effects of COVID-19 on travel behaviour and are considered to represent the existing environment before EB2 and EB3R construction.


**Figure 11: Parking survey locations**

### 3.7.1 Pakuranga Plaza

Pakuranga Plaza currently supports 1,355 parking spaces on site. The utilisation of 840 of these parks was captured in the parking survey in the areas outlined in **Figure 12**.

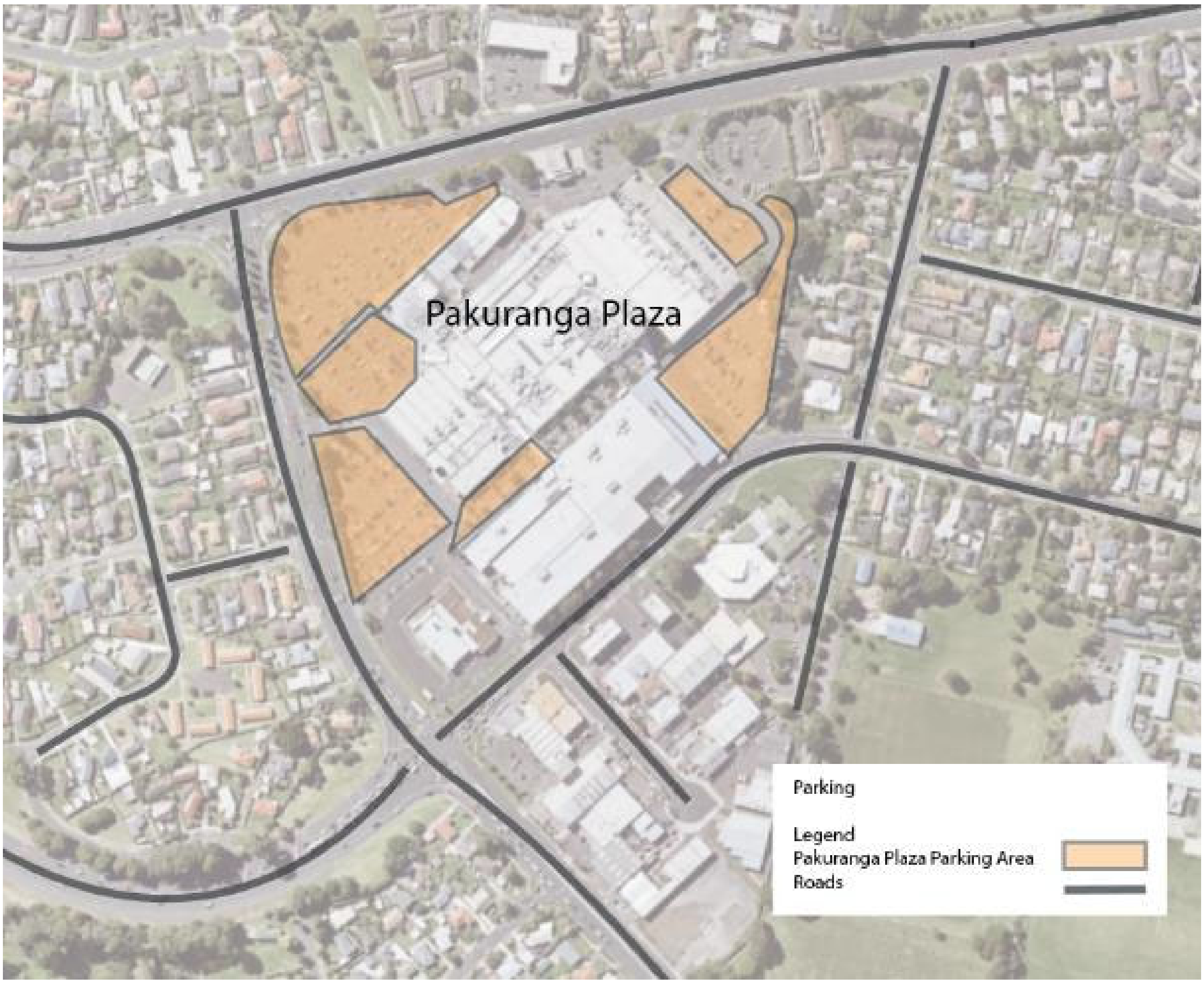



**Figure 12: Surveyed parking areas of Pakuranga Plaza**

**Table 5** outlines the findings of the surveys and **Figure 13** below illustrates the daily utilisation profile. The table and the graph indicate the Pakuranga Plaza parking is underutilized and does not exceed 60% capacity on a typical weekday or weekend.

**Table 5: Pakuranga Plaza parking utilisation summary**

| Parking Utilisation | Thursday 5 July (7am – 7pm) | Saturday 7 July (10am – 6pm) |
|---|---|---|
| Maximum Stay [hours] | 13 | 9 |
| Minimum Stay [hours] | 1 | 1 |
| Average Stay [hours] | 2.4 | 1.5 |
| Maximum Parking (Utilisation) | 418 (51%) | 471 (57%) |
| Minimum Parking (Utilisation) | 52 (6%) | 306 (37%) |
| Average Parking (Utilisation) | 301 (37%) | 392 (48%) |

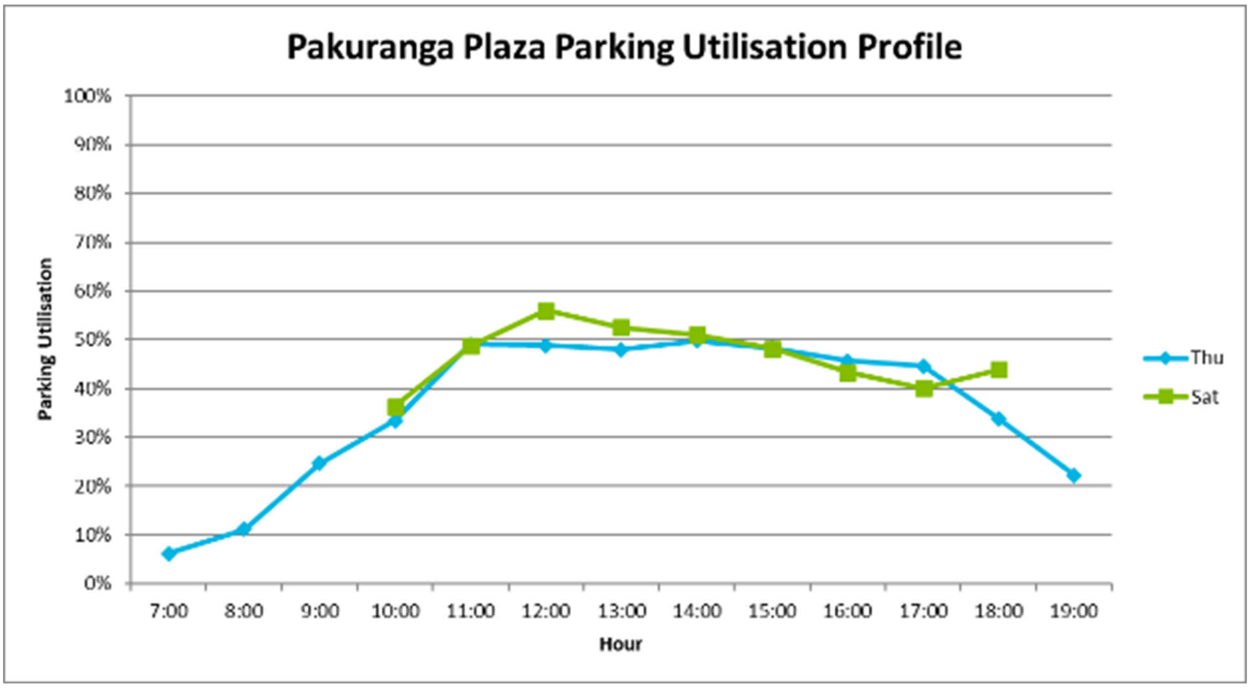



**Figure 13: Pakuranga Plaza parking utilisation profile**

### 3.7.2 Cortina Place

Cortina Place is a local cul-de-sac intersecting Reeves Road and provides access to a small commercial area. Overall, there are 25 on-street spaces available, with an average utilisation of 64% during weekdays and 71% during weekends. Full utilisation of the parking spaces occurs on weekend mornings for a short duration. The long duration of the average stay indicate that shop-owners and staff are likely using the spaces. **Table 6** outlines the findings of the survey and **Figure 14** below illustrates the parking utilisation profile across the days.

**Table 6: Cortina Pl parking utilisation summary**

| Parking Utilisation | Thursday 5 July (7am – 7pm) | Saturday 7 July (10am – 6pm) |
|---|---|---|
| Maximum Stay [hours] | 13 | 9 |
| Minimum Stay [hours] | 1 | 2 |
| Average Stay [hours] | 5.7 | 5.5 |
| Maximum Parking (Utilisation) | 21 (84%) | 25 (100%) |
| Minimum Parking (Utilisation) | 8 (32%) | 15 (60%) |
| Average Parking (Utilisation) | 16 (64%) | 18 (71%) |

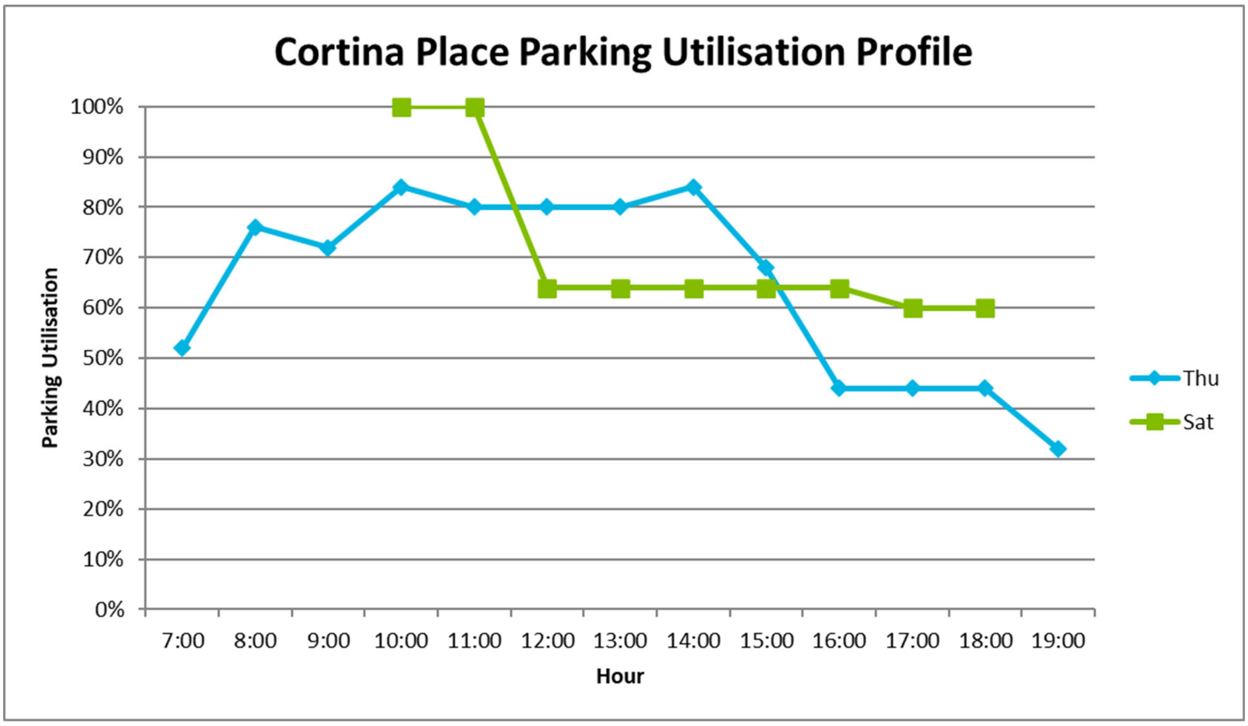



**Figure 14: Cortina Pl parking utilisation profile**

### 3.7.3 William Roberts Road

William Roberts Road connects Pakuranga Road to Reeves Road at its northern end and provides access to the Pakuranga Leisure Centre and Ti Rakau Park at its southern end. Overall, there are 127 parking spaces available, with an average utilisation of 49% on weekdays and 33% on weekends. There are 40 additional parks for the Ti Rakau Park which were considered off-street parking and were not surveyed. **Figure 15** outlines the area included in the parking survey of William Roberts Road.


**Figure 15: Surveyed area of William Roberts Rd**

**Table 7** outlines the findings of the survey and **Figure 16** illustrates the parking utilisation profile across the days.

**Table 7: William Roberts Rd parking utilisation summary**

| Parking Utilisation | Thursday 5 July (7am – 7pm) | Saturday 7 July (10am – 6pm) |
|---|---|---|
| Maximum Stay (hours) | 13 | 9 |
| Minimum Stay (hours) | 1 | 1 |
| Average Stay (hours) | 3.7 | 2.8 |
| Maximum Parking (Utilisation) | 105 (83%) | 113 (89%) |
| Minimum Parking (Utilisation) | 25 (20%) | 35 (28%) |
| Average Parking (Utilisation) | 62 (49%) | 42 (33%) |

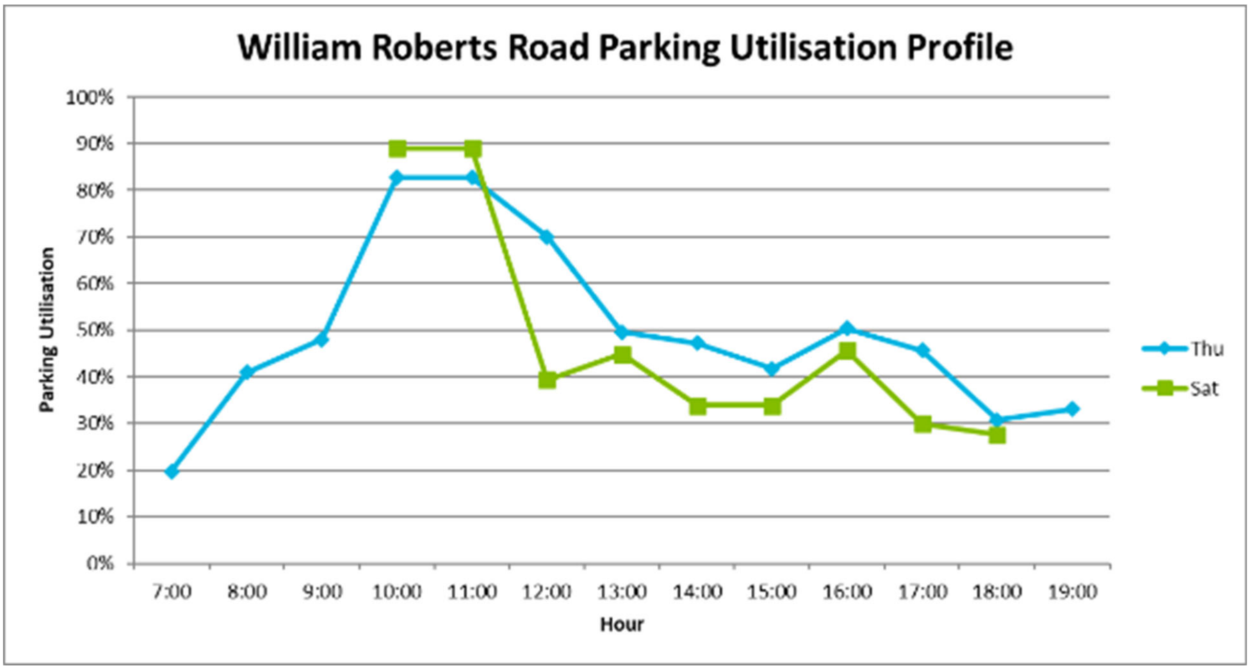



**Figure 16: William Roberts Rd parking utilisation profile**

Where the utilisation is around 90% for William Roberts Road and Cortina Place it is likely due to activities at the Pakuranga Leisure Centre or the Ti Rakau Park, such as Saturday morning sports. Additionally, the maximum stay for both Cortina Place and William Roberts Road was 13 hours, which is equivalent to the length of the parking survey. This indicates that a number of these parks are likely to be occupied by owners/ staff of the surrounding properties.

### 3.7.4 Ti Rakau Drive

Ti Rakau Drive is a major corridor connecting Pakuranga to East Tāmaki and Botany Town Centre in the southeast. The survey was conducted from the Roseburn Place intersection down to the Gossamer Drive intersection. Overall, there are 180 on-street parking spaces provided along Ti Rakau Drive, which are currently poorly utilised. **Table 8** below outlines the findings of the survey and **Figure 17** below illustrates the parking utilisation profile across the days.

**Table 8: Ti Rakau Dr parking utilisation summary**

| Parking Utilisation | Thursday 5 July (7am – 7pm) | Saturday 7 July (10am – 6pm) |
|---|---|---|
| Maximum Stay [hours] | 13 | 9 |

| Parking Utilisation | Thursday 5 July (7am – 7pm) | Saturday 7 July (10am – 6pm) |
|---|---|---|
| Minimum Stay [hours] | 1 | 1 |
| Average Stay [hours] | 3.0 | 2.7 |
| Maximum Parking (Utilisation) | 10 (5%) | 28 (15%) |
| Minimum Parking (Utilisation) | 3 (2%) | 9 (5%) |
| Average Parking (Utilisation) | 5 (3%) | 15 (8%) |

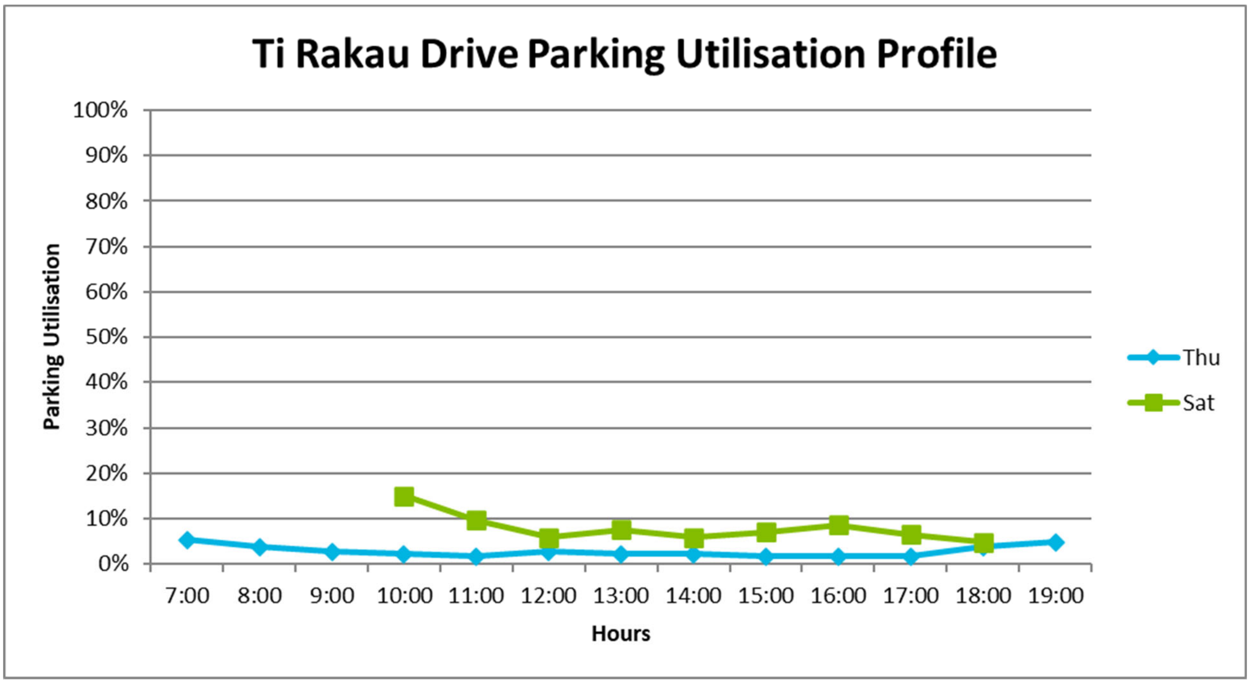



**Figure 17: Ti Rakau Dr parking utilisation profile**

The results shown are not unexpected. It is likely that the high traffic volume environment on Ti Rakau Drive does not create an appealing location to park vehicles given a perceived risk of accidents. Furthermore, this section of Ti Rakau Drive is surrounded by residential properties, and it would not be unreasonable to assume that properties have ample individual off-street parking due to the general size of these free-standing properties.

### 3.7.5 Edgewater Shops

The Edgewater Shops is a block of local shops located at the Ti Rakau Drive / Edgewater Drive intersection. Currently there are 30 parking spaces provided within an off-street parking area that serves the various commercial properties. The survey determined that the carpark is not fully utilised. **Table 9** outlines the findings of the survey and **Figure 18** illustrates the parking utilisation profile across the days.

**Table 9: Edgewater Shops parking utilisation summary**

| Parking Utilisation | Thursday 5 July (7am – 7pm) | Saturday 7 July (10am – 6pm) |
|---|---|---|
| Maximum Stay [hours] | 11 | 9 |
| Minimum Stay [hours] | 1 | 1 |
| Average Stay [hours] | 2.5 | 1.8 |
| Maximum Parking (Utilisation) | 18 (60%) | 12 (40%) |
| Minimum Parking (Utilisation) | 1 (4%) | 3 (10%) |
| Average Parking (Utilisation) | 11 (37%) | 8 (27%) |

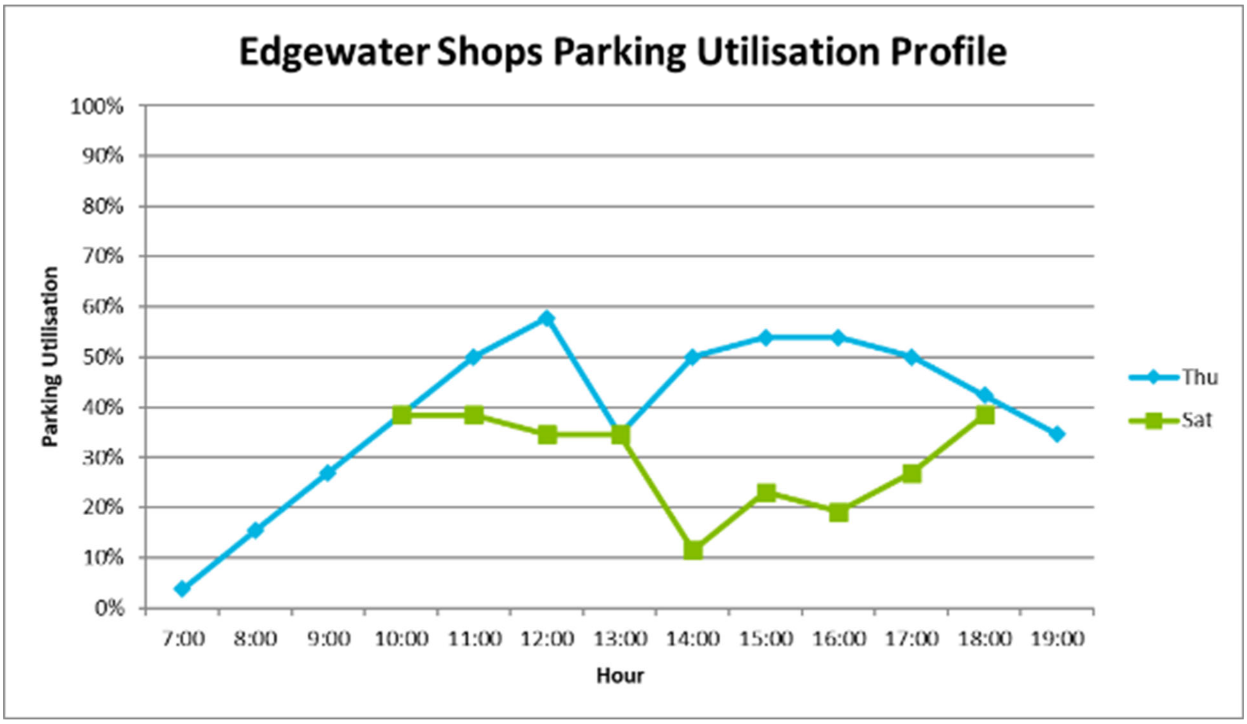



**Figure 18: Edgewater Shops parking utilisation profile**

Further analysis of the parking survey data shows that generally most vehicles are parked for short periods (one-hour survey intervals), with a minority of vehicles parked for longer periods (likely staff and shop owners). This is in line with what would be expected at these commercial properties. Parking utilisation is not expected to exceed 60% on a typical weekday or weekend.

### 3.7.6 Side roads

Due to the low utilisation of on-street parking along the side roads of Ti Rakau Drive, no further detailed analysis is presented. **Table 10** provides a summary of the parking surveys conducted on the side roads in EB2 and EB3R project areas.

**Table 10: EB2 and EB3R side roads parking utilisation summary**

| Side Road | Parking Utilisation Comments |
|---|---|
| Ayr Rd | Ayr Road is a local road providing access to residential houses with 70 on-street spaces available. However, it is a poorly utilised road, with the maximum utilisation on Thursday being 12% and 6% on Saturday. |
| Roseburn Pl | Roseburn Place is a cul-de-sac joining to Ti Rakau Drive, providing access to residential properties. There are 45 on-street spaces available. However, it is poorly utilised with the maximum utilisation on Thursday being 9% and 10% on Saturday. The low utilisation could be attributed to residents having ample parking within their properties and visitors parking on the street. |
| Mattson Rd | Similar to Roseburn Place, Mattson Road is a cul-de-sac off Ti Rakau Drive with 80 on-street spaces. Again, it is poorly utilised with the maximum utilisation on Thursday being 4% and 8% on Saturday. |
| Marriott Rd | Marriott Road connects Ti Rakau Drive to Udys Road with 175 on-street parking spaces available. It is a poorly utilised road with a maximum of six parked vehicles. |
| Chevis Pl | Chevis Place is a cul-de-sac off Ti Rakau Drive providing access to residential properties to the east. There are 45 on-street parking spaces available. However, these spaces are poorly utilised with a maximum utilisation of 4% on Thursday and 16% on Saturday. The low utilisation could be attributed to most residents having ample parking within their properties. |
| Edgewater Dr | Edgewater Drive is a collector with a crescent shape that connects to Ti Rakau Drive at two locations. It provides access to residential properties, Edgewater College and Pakuranga Retirement Village. There are 500 on-street parking spaces available along the length of the road. It would be expected to see high utilisation of on-street parking during school peak periods; however, this is not the case, with a maximum weekday utilisation of five parked vehicles. A similar trend was observed on Saturday with a maximum of six vehicles parked within an hour. |
| Wheatley Ave | Wheatley Avenue is a small cul-de-sac off Ti Rakau Drive between the two sections of Edgewater Drive. It serves a small residential community and provides 30 on-street parking spaces. It is poorly utilised during weekdays with the maximum utilisation being 10%. This was observed to increase to 20% during the weekend. |

## 3.8 Crash Environment

### 3.8.1 Crash Analysis System Data

All reported crashes within the EB2 and EB3R project area were extracted from the Crash Analysis System (CAS) for a five-year period from 2015 to 2019. Data from 2020 was not used as not all the data was available. This was due to a lag in uploading crash data and the impacts of COVID-19. For this assessment, the focus on the extracted data was in the area shown in **Figure 19**.

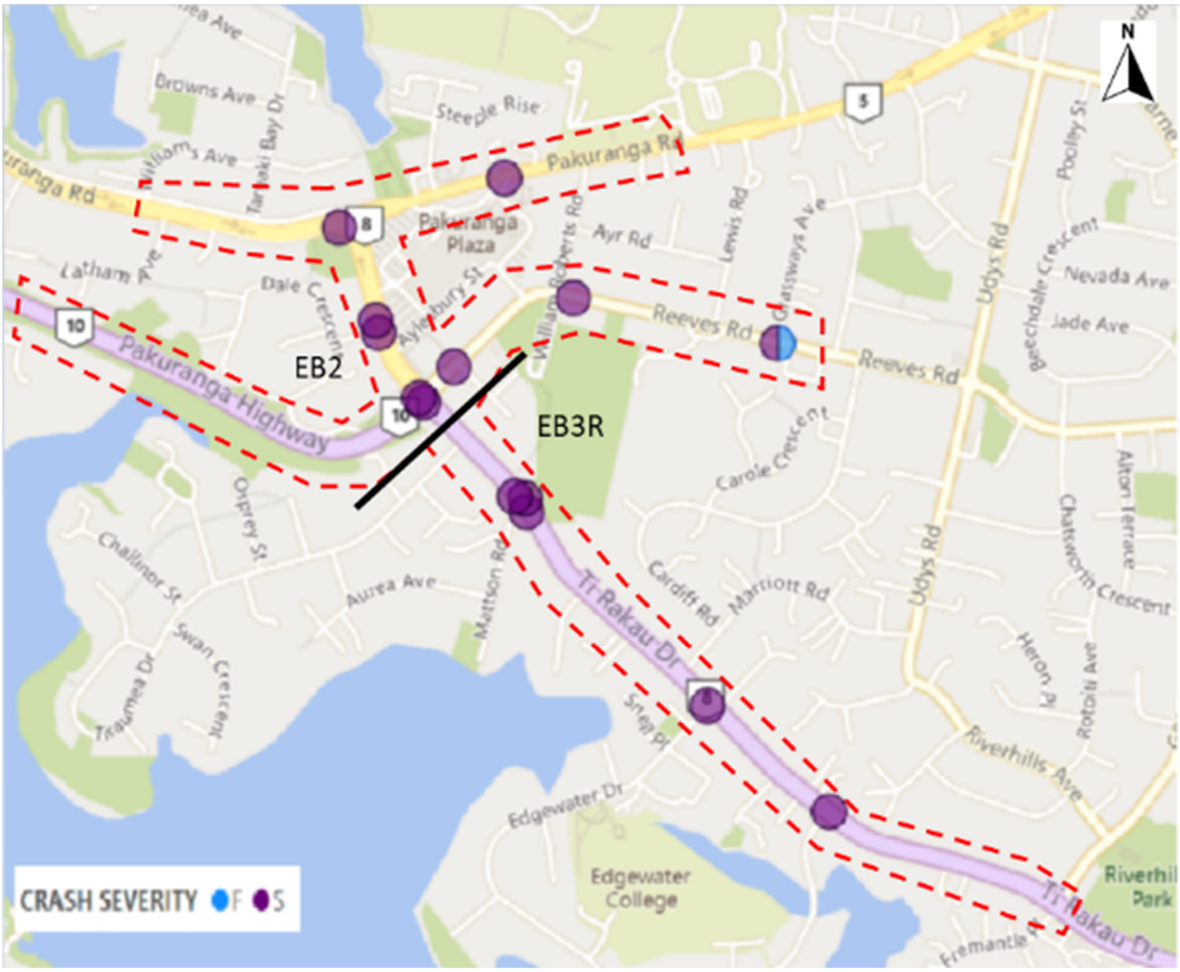



**Figure 19: Extent of extracted CAS data for EB2 and EB3R project areas**

There was 1 fatal crash and 14 serious injury crashes in the 2015 – 2019 time period:

- **Fatal:** Motorcycle collision with a vehicle which failed to give way turning right out of a side street or driveway
- **Serious Injury:** 6 pedestrian crashes
- **Serious Injury:** 4 instances where a right turning vehicle fails to give way to oncoming traffic (one general vehicle vs general vehicle, one general vehicle turns in front of a moped, one general vehicle turns in front of motorcycle, one general vehicle turns in front of a truck)
- **Serious Injury:** 1 loss of control whilst cornering, serious injury crash with a general vehicle
- **Serious Injury:** 1 crash involving a van door being opened on a cyclist
- **Serious Injury:** 2 instances of rear ends at the Reeves Road intersection (one general vehicle vs general vehicle crash, one general vehicle vs motorcycle crash)

### 3.8.2 Safe System Assessment

A Safe System Assessment (SSA) was undertaken for the entire Project area[15]. The SSA was conducted in accordance with the Auckland Transport Safe System Assessment Guidelines which are based on the Austroads 2016, Research Report AP-R509-16, Safe System Assessment Framework. A summary of the SSA is provided below.

The SSA assessed a total of ten crash types as described below:

1. Run-off-road (R-O-R): Involving one or more vehicle(s) losing control on a curve or straight
2. Head-on (H-O): Crashes involving two or more vehicles travelling in opposite directions
3. Intersection (INT): Crashes involving two or more vehicles travelling in adjacent directions
4. Other: Includes manoeuvring, overtaking, parking and miscellaneous crashes
5. Motorcycle (M/C): Any crash type above involving a motorcycle
6. P1: Any crash involving a pedestrian and a vehicle turning at an intersection
7. P2: Any crash involving a pedestrian and vehicle travelling straight (midblock crossing)
8. P3: Any crash involving a pedestrian and vehicle travelling straight through an intersection
9. C1: Any crash involving a cyclist being struck by a vehicle travelling in the same direction
10. C2: Any Crash involving a cyclist being struck by a vehicle at an intersection (turning or straight)

Each crash type is scored based on exposure, likelihood and severity with a value between 0 and 4. A lower score corresponds with a safer system. A score of 0 for exposure, likelihood or severity means that a particular crash type is not applicable to the location being considered and will result in a product score of 0. **Table 11** and **Table 12** outline the safe system score of the existing environment in the EB2 and EB3R project areas. Location A in EB2 and locations F and H in EB3R indicate station locations on completion of the full Eastern Busway Project.

**Table 11: EB2 existing environment safe systems assessment**

| ZONE EB2 ASSESSMENT SUMMARY | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| EXISTING LAYOUT | R-O-R | H-O | INT | OTHER | M/C | P1 | P2 | P3 | C1 | C2 | TOTAL |
| A) PAKURANGA EB STATION | 16 | 16 | 32 | 16 | 64 | 24 | 48 | 0 | 36 | 36 | 288 |
| B) TI RAKAU DR / PALM AVE | 16 | 16 | 32 | 16 | 48 | 24 | 0 | 48 | 36 | 36 | 272 |
| C) TI RAKAU DR / REEVES RD | 16 | 16 | 24 | 16 | 48 | 18 | 0 | 24 | 36 | 27 | 225 |
| D) TI RAKAU DR / TIRAUMEA DR | 8 | 16 | 16 | 24 | 48 | 24 | 48 | 0 | 31.5 | 27 | 242.5 |
| E) TI RAKAU DR / MATTSON RD | 16 | 16 | 24 | 24 | 48 | 18 | 48 | 36 | 31.5 | 27 | 288.5 |
| F) PAKURANGA RD / TI RAKAU DR | 16 | 16 | 24 | 16 | 48 | 12 | 0 | 24 | 36 | 36 | 228 |
| G) PAKURANGA RD / REEVES RD | 16 | 24 | 32 | 16 | 64 | 18 | 0 | 48 | 36 | 36 | 290 |

**Table 12: EB3R existing environment safe systems assessment**

| ZONE EB3R ASSESSMENT SUMMARY | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| EXISTING LAYOUT | R-O-R | H-O | INT | OTHER | M/C | P1 | P2 | P3 | C1 | C2 | TOTAL |
| A) ROSEBURN PL | 8 | 16 | 32 | 24 | 64 | 24 | 48 | 0 | 27 | 36 | 279 |
| B) MARRIOTT RD | 8 | 16 | 32 | 24 | 64 | 24 | 48 | 0 | 27 | 36 | 279 |
| C) EDGEWATER DR / CHEVIS PL | 8 | 16 | 16 | 24 | 48 | 24 | 48 | 24 | 27 | 27 | 262 |
| D) WHEATLY AVE | 8 | 16 | 32 | 24 | 64 | 24 | 36 | 0 | 27 | 36 | 267 |
| E) EDGEWATER DR | 8 | 0 | 32 | 24 | 64 | 24 | 0 | 0 | 27 | 36 | 215 |
| F) GOSSAMER STATION WB | 8 | 0 | 0 | 24 | 32 | 0 | 0 | 0 | 27 | 18 | 109 |
| G) GOSSAMER DR INTERSECTION | 24 | 24 | 24 | 24 | 48 | 18 | 0 | 36 | 36 | 18 | 252 |
| H) GOSSAMER STASTION EB | 8 | 16 | 0 | 8 | 16 | 0 | 32 | 0 | 36 | 0 | 116 |

[15] EB234-1-TE-RP-Z0_000003

Motorcycle crashes were identified as the highest risk in the existing layout due to a maximum score of 4 for both exposure and severity.

## 3.9 Over-Dimension and Over-Weight (OD and OW) Routes

Within the Project area there are a number of roads that have been defined by Waka Kotahi as strategic Over-Dimensional (OD) routes[16]. These support the large commercial and industrial areas in and around Burswood and East Tāmaki which are the key generators of freight and OD loads. The OD routes relevant to the EB2 and EB3R project areas are listed below and shown in **Figure 20**:

- Pakuranga Road – Ti Rakau Drive to Howick
- Pakuranga Highway – Ti Rakau Drive to Waipuna Road
- Ti Rakau Drive – Pakuranga Road to Te Irirangi Drive

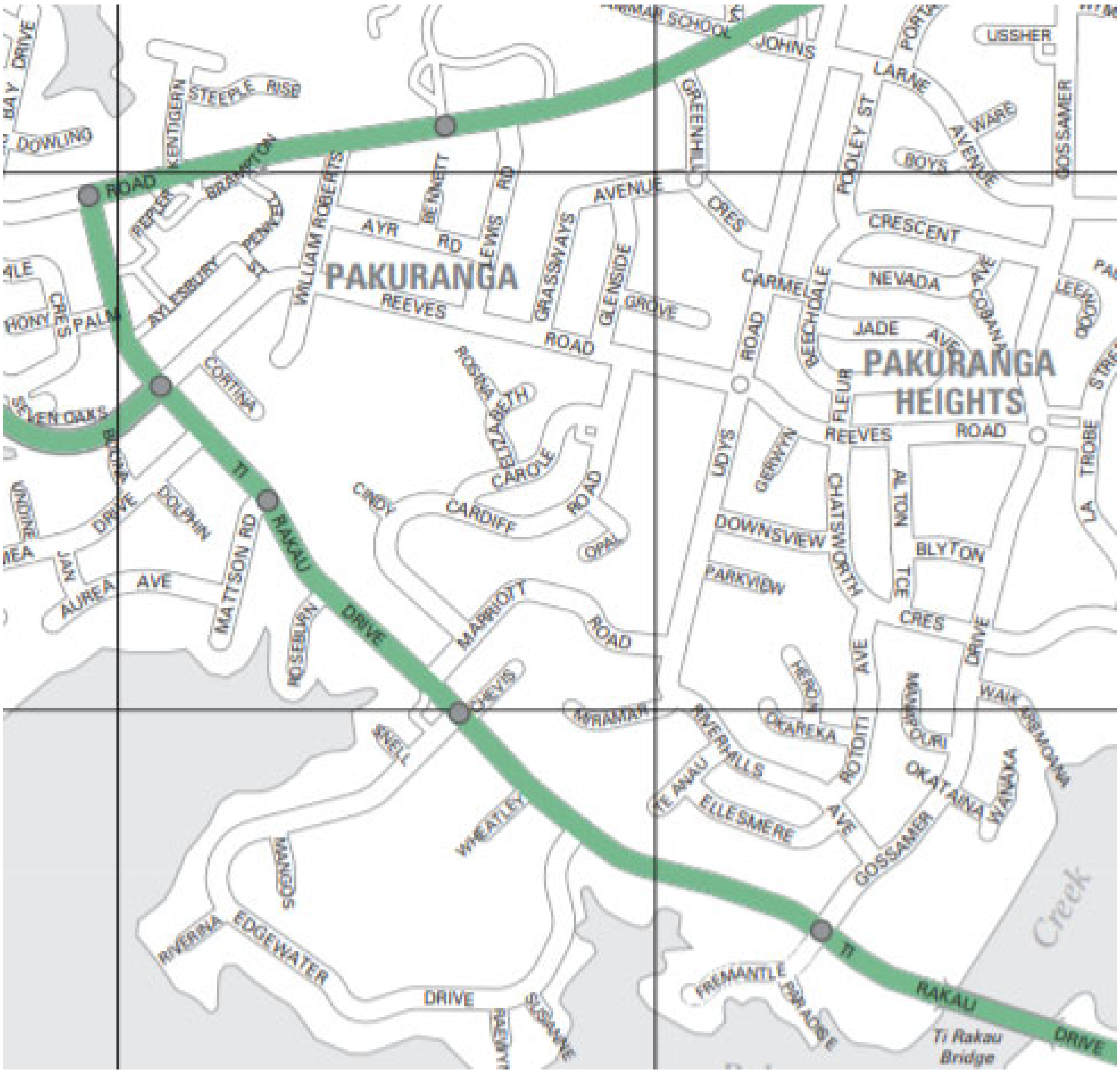



**Figure 20: Over-dimensional vehicle routes**

It is worth noting that no roads within the EB2 and EB3R project areas are designated as Over-Weight (OW) routes. The nearest OW route is Te Irirangi Drive further southeast, from State Highway 1 up to Botany Town Centre.

[16] http://nzta1.cwp.govt.nz/assets/resources/overdimen-veh-route-maps/4-auckland/docs/OD_4-35%20Auckland

**Table 13** below shows the current heavy commercial vehicle (HCV) percentage of traffic that travel through the EB2 and EB3R project areas. HCV data were sourced through a combination of AT traffic counts and RAMM data.

**Table 13: Existing HCV percentage**

| Roads | HCV Percentage |
|---|---|
| Pakuranga Rd (east of Ti Rakau Dr) | 6% |
| Pakuranga Rd (west of Ti Rakau Dr) | 7% |
| Ti Rakau Dr (Pakuranga Rd – SEART) | 7% westbound, 8% eastbound |
| Ti Rakau Dr (SEART – Edgewater Dr (west)) | 8% |
| Ti Rakau Dr (Edgewater Dr, west to east) | 9% westbound, 8% eastbound |
| SEART | 3% |
| William Roberts Rd | 4% |
| Edgewater Dr | 3% |

## 3.10 Changes to the Baseline Traffic Environment

This section provides an overview of the changes to the baseline traffic environment that were included in the traffic modelling assessments conducted in this ITA.

### 3.10.1 EB1

Included in the modelling scenarios was EB1, which is a key component of the overall Project. It is the segregated busway connection from Panmure train station to Pakuranga Town Centre. The eastern terminus of EB1 is located beside the western boundary of the EB2 project area, at the Pakuranga Road / Ti Rakau Drive intersection and is shown in **Figure 21**.

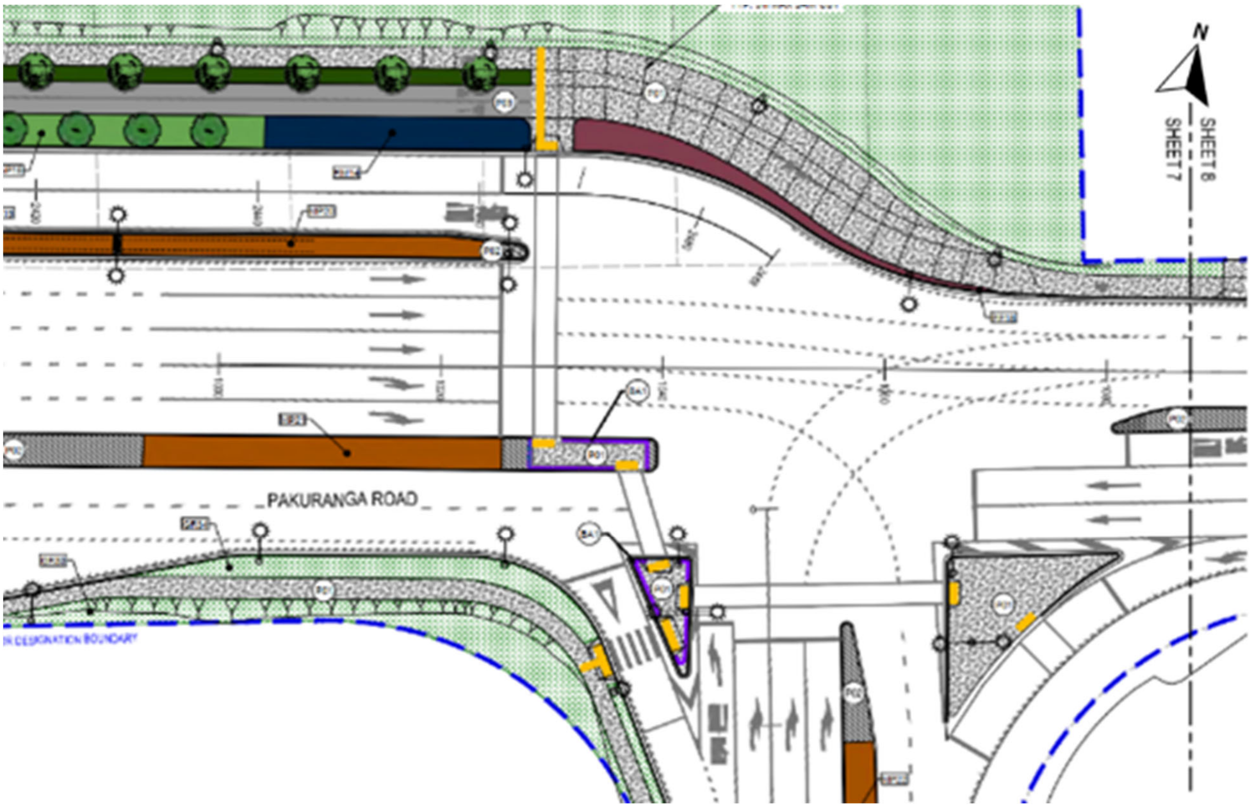



**Figure 21: EB1 tie-in at Pakuranga Rd / Ti Rakau Dr intersection**

### 3.10.2 WRRE Works

The WRRE construction will precede EB2 and EB3R, and is anticipated to have a duration of approximately eight months, from November 2022 to June 2023. The WRRE[17] will consist of:

- The extension of William Roberts Road further south to Ti Rakau Drive
- A new priority-controlled, left-in left-out (LILO) only intersection with Ti Rakau Drive at the southern end of William Roberts Road. The kerbside lane of Ti Rakau Drive eastbound will be a shared through and left-turn lane. It should be noted that a second lane at the northern approach will also be constructed during the WRRE but will not be operational until later stages of the overall construction of the Project (EB2)
- The extension of Cortina Place further east to connect to William Roberts Road. A new raised priority-controlled intersection with William Roberts Road at the eastern end of Cortina Place. All approaches to the intersection will provide one approach lane and one exit lane
- Five parallel on-street parking spaces will be provided on the eastern side of William Roberts Road and 11 angled parking spaces on the western side. A new raised pedestrian crossing will also be provided on William Roberts Road at Ti Rakau Park. The posted speed limit of this section of William Roberts Road will be 30 km/h

**Figure 22** shows the layout of the William Roberts Road and Cortina Place extensions upon completion.

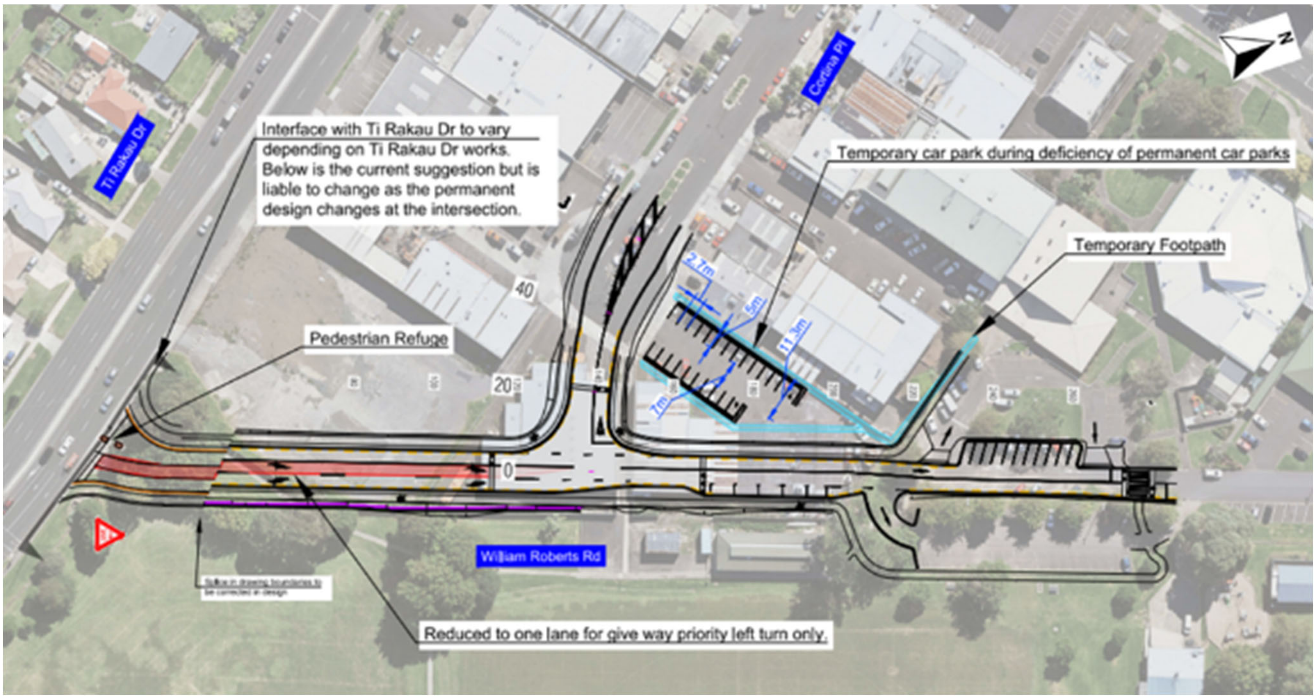



**Figure 22: WRRE layout**

17 EB234-1-TE-RP-Z2-0001-A1-William Roberts Rd Extension ITA

### 3.10.3 Other EB2 and EB3R Enabling Works

An assessment was undertaken to understand the potential traffic redistribution that could occur on the network due to the closure of Reeves Road, which is required for the construction of the RRF during EB2. Furthermore, the assessment was aimed at identifying other potential enabling works that may be required to mitigate the effects of the resulting traffic redistribution. These enabling works will form part of the EB2 and EB3R consent package. Considering the construction programme, these enabling works will follow the WRRE and will precede the closure of Reeves Road during EB2 and EB3R construction.

The full results of the assessment are presented in the Technical Advice Memorandum provided in **Appendix A**, hereafter referred to as the 'Reeves Road Detour Assessment'. A summary of the results, and the enabling works required before the closure of Reeves Road, is presented below. **Figure 23** shows the proposed detour route during the Reeves Road closure.


**Figure 23: Proposed detour route during Reeves Rd closure**

The detour route along William Roberts Road north, westbound along Pakuranga Road and eastbound along Ti Rakau Drive towards SEART was determined to be less attractive than expected. Overall, only a small percentage of traffic could be expected to route along the proposed detour, likely due to the already congested nature of the Pakuranga Road / William Roberts Road intersection.

It was determined that inbound (citybound) traffic, during the AM peak, could be expected to detour via Gossamer Road to Ti Rakau Drive. Traffic in the outbound direction, during the PM peak, could be expected to return via Pakuranga Road and via SEART turning right onto Ti Rakau Drive.

It should be noted that the Reeves Road Detour Assessment followed a similar methodology as the WRRE ITA of assessing a 'future Do-Minimum' scenario in comparison to a 'future with detour' scenario. This approach allowed for the inclusion of known changes to the network that are expected to be completed before the Reeves Road closure and the associated traffic distribution on the network, such as the WRRE.

This assessment indicated that mitigation works would be required at the Ti Rakau Drive / Reeves Road and Ti Rakau Drive/ Gossamer Drive intersections.

#### *3.10.3.1 Ti Rakau Drive / Reeves Road Intersection*

Intersection performance is expected to be poor (LOS F) during both the AM and PM peaks in the Do-Minimum scenario. The Reeves Road Detour AM peak intersection performance could be expected to be slightly improved (LOS E), however the PM peak would still be LOS F.

The SEART off-ramp right-turn lanes into Ti Rakau Drive are expected to operate at LOS F during the PM peak. The increase in traffic volumes, due to Reeves Road closure, would result in delay increasing from around 50 sec to 215 sec (3.6 min), which would require mitigation.

Various mitigation measures were tested, however only the preferred option (Mitigation 1) is presented below. Mitigation 1 consists of converting the through lane to a right-turn lane at the off-ramp from SEART to Ti Rakau Drive as well as an additional exit lane on Ti Rakau Drive eastbound between Reeves Road and William Roberts Road. **Table 14** provides a summary of the Ti Rakau Drive / Reeves Road intersection performance.

**Table 14: Reeves Rd Detour Assessment – Ti Rakau Dr / Reeves Rd intersection performance summary**[18]

| Scenario | Level-of-Service (LOS) | | Degree of Saturation (DOS) | | Average Delay [sec] | |
|---|---|---|---|---|---|---|
| | AM | PM | AM | PM | AM | PM |
| Do-Minimum | F | F | 0.90 | 1.13 | 178 | 83 |
| Reeves Rd Detour | E | E | 0.91 | 1.02 | 60 | 75 |
| Mitigation 1 | D | E | 0.89 | 0.96 | 53 | 57 |

Mitigation 1 is expected to lead to improved intersection performance during both the AM and PM peaks compared to the Do-Minimum and the Reeves Road Detour scenarios.

[18] SIDRA analysis carried out based on traffic volumes for a 2028 horizon year.

### 3.10.3.2 Ti Rakau Drive / Gossamer Drive Intersection

The right-turn traffic volume from Gossamer Drive into Ti Rakau Drive is expected to increase by 160 veh/h in the AM peak during the Reeves Road closure. The resultant intersection performance is expected to be poor (LOS F), compared to the LOS E of the Do-Minimum scenario. This would require mitigation. The intersection is expected to experience little change during the Reeves Road closure in the PM peak and will remain at LOS D.

Again, various mitigation measures were tested, however only the preferred option (Mitigation 2) is presented below. Mitigation 2 consists of the following changes to the northern Gossamer Drive approach to the intersection; converting the short left-turn slip lane to pass through the intersection, converting the centre lane to a full length left-turn lane, providing an additional short lane for the shared through and right-turn movements, and increasing the length of the short kerbside exit lane (see **Figure 24**).

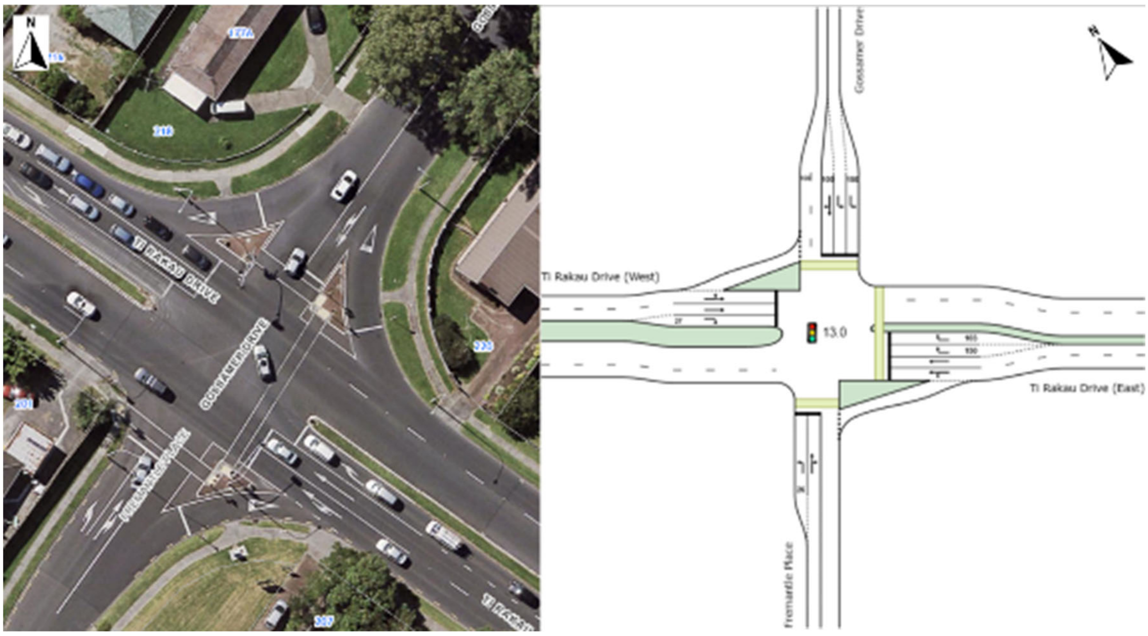



**Figure 24: Ti Rakau Dr / Gossamer Dr intersection layout (left = current, right = enabling works)**

**Table 15** provides a summary of the Ti Rakau Drive / Gossamer Drive intersection performance.

**Table 15: Reeves Rd Detour Assessment – Ti Rakau Dr / Gossamer Dr intersection performance summary[19]**

| Scenario | Level-of-Service (LOS) | | Degree of Saturation (DOS) | | Average Delay [sec] | |
|---|---|---|---|---|---|---|
| | AM | PM | AM | PM | AM | PM |
| Do-Minimum | D | D | 1.02 | 0.90 | 48 | 45 |
| Reeves Rd Detour | F | D | 1.25 | 0.88 | 168 | 43 |
| Mitigation 2 | D | D | 0.89 | 0.86 | 37 | 37 |

Mitigation 2 is expected to lead to improved intersection performance during both the AM and PM peaks compared to the Do-Minimum and the Reeves Road Detour scenarios.

[19] SIDRA analysis carried out based on traffic volumes for a 2028 horizon year.

# 4 EB2 and EB3R Design and Construction

## 4.1 EB2 and EB3R Overview

As stated in **Section 3.4.1**, without the Project, traffic volumes are predicted to increase on Pakuranga Road and Ti Rakau Drive (between Pakuranga Road and Reeves Road), reaching the capacity of the corridors by 2028. It is likely that large queues and delays on these sections will act as a bottle neck for the rest of the network. This issue is also highlighted in **Section 3.4.2**, with large travel times on these specific sections of the network in the existing environment.

The Project seeks to improve congestion and travel times across the transport network, and particularly in the area around the Pakuranga Town Centre. This will be achieved through the construction of the RRF, which will provide a direct and faster link between Pakuranga Road and SEART, as well as dedicated bus lanes for bus services.

Bus travel times will be improved primarily through the construction of dedicated bus lanes. Buses will also have priority at intersections by way of 'call-ahead' features and advance loops to extend the traffic signal green time when a bus is within approach distance of an intersection. Furthermore, the buses will in future laydown at new bus stations with improved efficiency and merge back into dedicated bus lanes, instead of general traffic lanes, further improving travel times as well as safety.

The Project will also seek to improve the catchment areas of public transport via improved bus stations and improved walking and cycling infrastructure. In the future, all bus stations in the EB2 and EB3R project area will provide seating and sheltered cover as well as bicycle and scooter parking for passengers. Separated walkways and cycleways will improve safety, amenity and travel time for an all-around improved trip to/from the bus stations.

Pedestrian and cyclist safety and amenity will be improved through the construction of separated footpaths and cycleways. Raised tables will be provided across all approaches on the southern side of Ti Rakau Drive as well as both intersections along Cortina Place. Additional signalised pedestrian crossings will be provided across Pakuranga Road, Ti Rakau Drive, Reeves Road, Aylesbury Street and William Roberts Road. A raised pedestrian crossing will also be provided on William Roberts Road near the Ti Rakau Park.

Lastly, the Project will seek an all-around improvement in safety to all users through the use of relevant TDM design standards. Improved pedestrian crossing facilities will be provided to discourage jaywalking and to improve amenity. All unprotected left-turn slip lanes will be removed and the movements will be signalised.

## 4.2 EB2 and EB3R Design and Construction Works

The sections below provide details, split between the EB2 and EB3R project areas, of the proposed design and construction works. Details are also provided to highlight when in the construction programme these works will occur as this is important to understand the development of the modelling scenarios presented in **Section 5.2.2** and **Section 6.3.2**.

### 4.2.1 EB2 – Design and Construction Works

The general extent of the EB2 project area encompasses the following roads (see **Figure 25**, dark purple):

- Ti Rakau Drive from Pakuranga Road to Reeves Road
- SEART from the eastern Waipuna Bridge abutment to Ti Rakau Drive
- Reeves Road from Ti Rakau Drive to William Roberts Road
- Pakuranga Road from Ti Rakau Drive to William Roberts Road
- Specific sections of Palm Avenue, Aylesbury Street, Seven Oaks Drive, Cortina Place, and William Roberts Road


**Figure 25: EB2 general extent (dark purple)**

EB2 will be a complex area with multiple work zones occurring simultaneously against different time scales. Below are sections of geographical works roughly in sequential order, however significant overlap will occur between some of these sections of work. A full set of EB2 layout drawings is provided in **Appendix B**. The EB2 construction works are anticipated to occur over a period of approximately four years.

### *4.2.1.1 Reeves Road and the Flyover*

Reeves Road between Ti Rakau Drive and William Roberts Road will consist of one lane per direction, similar to the existing environment. However, unlike the existing environment, Reeves Road will not serve as a through route from SEART to Pakuranga Heights. In the future, it will serve buses between Ti Rakau Drive and Pakuranga Road, and will provide access to the Pakuranga Plaza and businesses on Cortina Place.

The lower section of Reeves Road between Ti Rakau Drive and Cortina Place as well the new Reeves Road 'ramps' connecting to the RRF tie-in at Pakuranga Road will be bus only lanes to improve bus travel times between Ti Rakau Drive and Pakuranga Road. Reeves Road between Cortina Place and William Roberts Road will be mixed traffic with access to Pakuranga Plaza at Aylesbury Street and the private access road. Movements out from Cortina Place and the private access road will be northbound only onto Reeves Road. The intersections with Aylesbury Street and William Roberts Road will be signalised upon completion of the RRF to avoid midblock queues blocking the bus lane ramps.

The RRF will in future provide a direct and faster link between Pakuranga Road and SEART, by eliminating the need to travel along Ti Rakau Drive. The RRF will consist of four lanes, two lanes per direction. Adjacent to the Pakuranga Plaza, the alignment of the RRF will be directly above Reeves Road.

Raised tables will be provided across the western and eastern approaches at the Reeves Road / Cortina Place intersection. Signalised pedestrian crossings will be provided across the southern, western and northern approaches at the Reeves Road / Aylesbury Street intersection and all approaches at the William Roberts Road / Reeves Road intersection. The existing midblock pedestrian crossing will be removed to avoid potential sightline issues. As the columns of the RRF will be located along the centre of Reeves Road, the view of pedestrians may be obstructed to vehicles.

**Figure 26** shows the proposed layout of Reeves Road underneath the RRF.

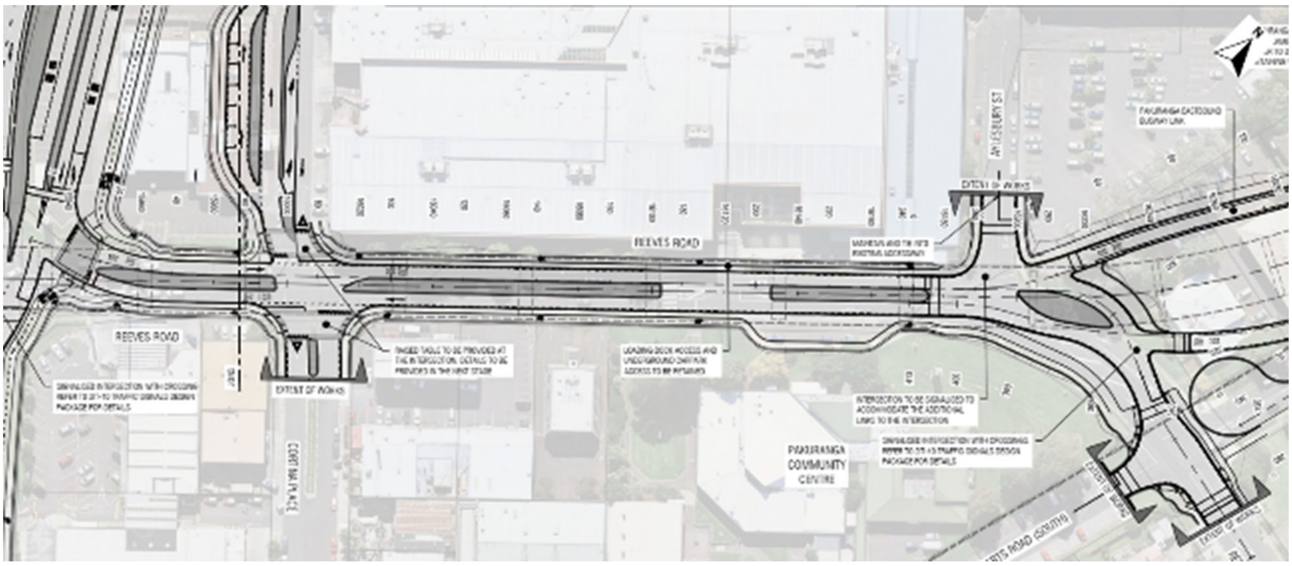



**Figure 26: Reeves Rd (underneath RRF)**

**Figure 27** shows the proposed layout of the RRF itself.

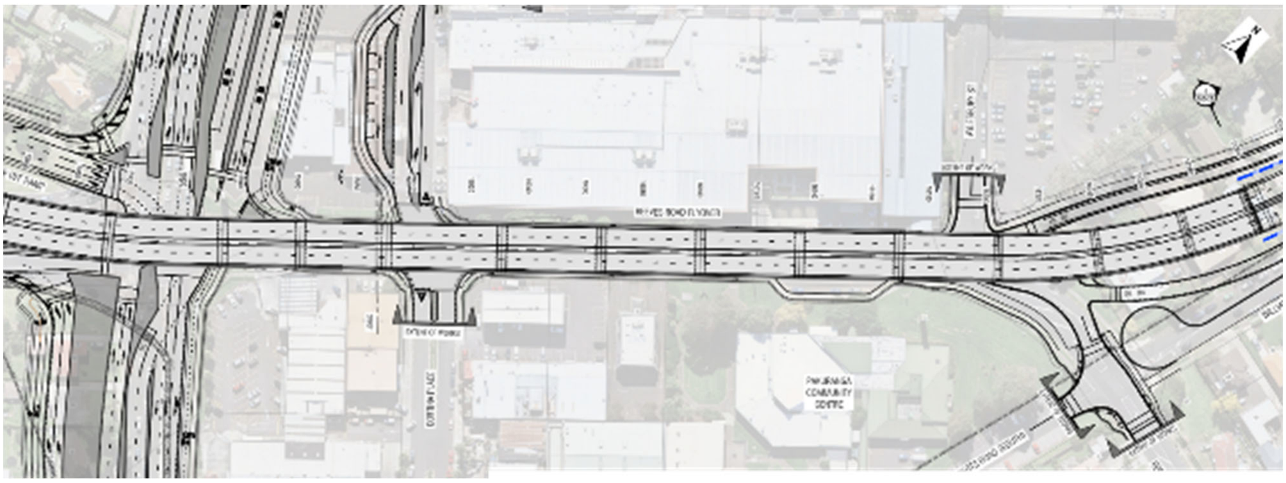


**Figure 27: RRF**

The works on Reeves Road will be extensive and will encompass offline works heading north along William Roberts Road. Reeves Road will be closed to enable these works and will not fully reopen until all works associated with the RRF and the remaining environment below the RRF have been completed.

**Figure 28** shows the indicative work zones associated with Reeves Road and the RRF. The works associated with the RRF, and Reeves Road underneath are anticipated to have a duration of approximately three years.

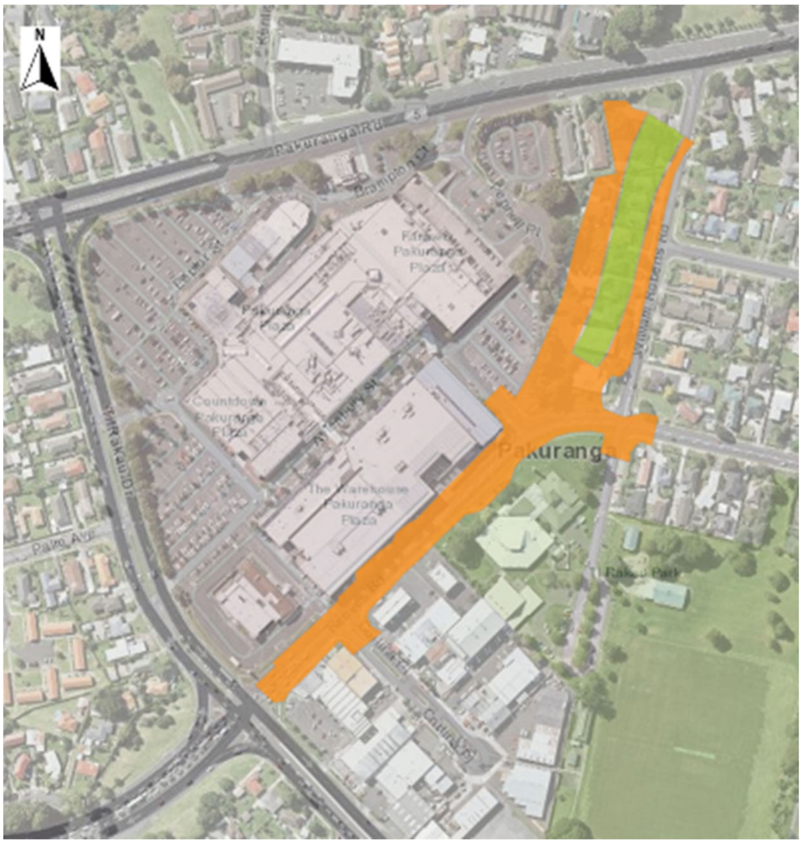


**Figure 28: Indicative work zones – Reeves Rd and RRF**

The existing alternate routes, during the Reeves Road closure, are at capacity and additional traffic loading will result in increased delays. This means that to enable the closure of Reeves Road without significant effects, three works must be completed prior to the closure to accommodate the displaced traffic volumes:

1. William Roberts Road extension. Effects of these works have been assessed in the WRRE ITA, see **Section 3.10.2**.

2. Ti Rakau Drive enabling works. To close Reeves Road the through lane from SEART must be converted into a right-turn lane, requiring a third exit lane on Ti Rakau Drive eastbound between Reeves Road and William Roberts Road to accommodate the eastbound traffic flows through the intersection (see **Section 3.10.3.1**). The existing median will need to be removed and replaced with median delineators.

3. Gossamer Drive enabling works. During the Reeves Road closure, citybound traffic is expected to find an alternate route, via Gossamer Drive then proceeding along Ti Rakau Drive. As stated in **Section 3.10.3.2**, the enabling works at Gossamer Drive will include converting the short left-turn slip lane to pass through the intersection, converting the centre lane to a full left-turn lane, providing an additional short lane for the shared through and right-turn movements, and increasing the length of the kerbside exit lane.

The traffic modelling undertaken for EB2 and EB3R assumes that these three works have been completed and so form part of the baseline traffic environment discussed in **Section 3.10**.

#### *4.2.1.2 William Roberts Road North*

In the future, William Roberts Road north will no longer function as a through route between Reeves Road and Pakuranga Road, but rather as a local road to the surrounding residential properties. William Roberts Road north will be closed off once works are completed at the new Ti Rakau Drive / William Roberts Road intersection further south.

During this phase of construction, each end of William Roberts Road will be converted to a cul-de-sac with access off Ayr Road only. This in turn will remove the southern approach at the Pakuranga Road / William Roberts Road intersection, resulting in a no stop intersection until the RRF is built. The northern approach at the William Roberts Road / Reeves Road intersection will also be removed, resulting in a T-junction arrangement.

The majority of the existing footpath on the eastern side of William Roberts Road will be retained. **Figure 29** below shows the proposed layout of William Roberts Road north.

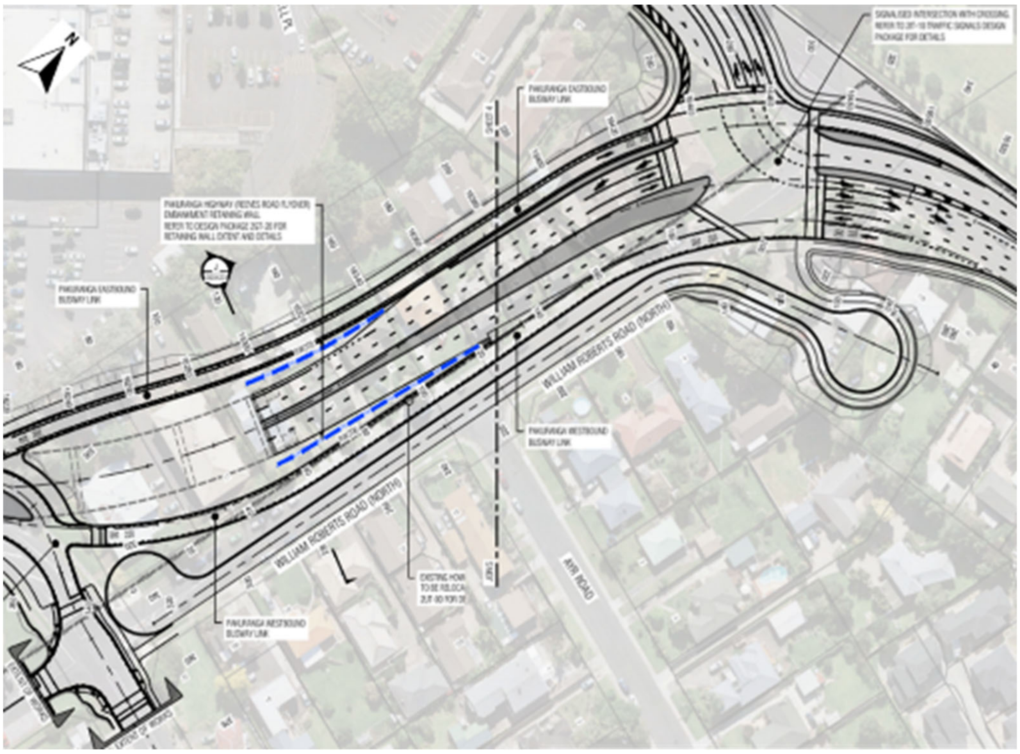


Figure 29: William Roberts Rd north

**Figure 30** shows the indicative work zone of William Roberts Road north. The construction of William Roberts Road north is anticipated to have a duration of approximately six months.


Figure 30: Indicative work zones – William Roberts Rd north

#### 4.2.1.3 Pakuranga Road Tie-In

The RRF will tie into Pakuranga Road with two through lanes per direction in addition to the dedicated bus lanes from Reeves Road. The Pakuranga Road western approach will tie into the intersection in a T-arrangement, providing two full length left-turn lanes for this major movement and one short right-turn lane onto the RRF.

The eastern approach will consist of a short bus lane, two full length through lanes, one full length right-turn lane and an additional short right-turn lane. The southern RRF approach will consist of a bus lane from Reeves Road, a short left-turn lane, and two full length through lanes. Signalised pedestrian crossings will be provided across all approaches. **Figure 31** shows the proposed layout of the Pakuranga Road / RRF tie-in.

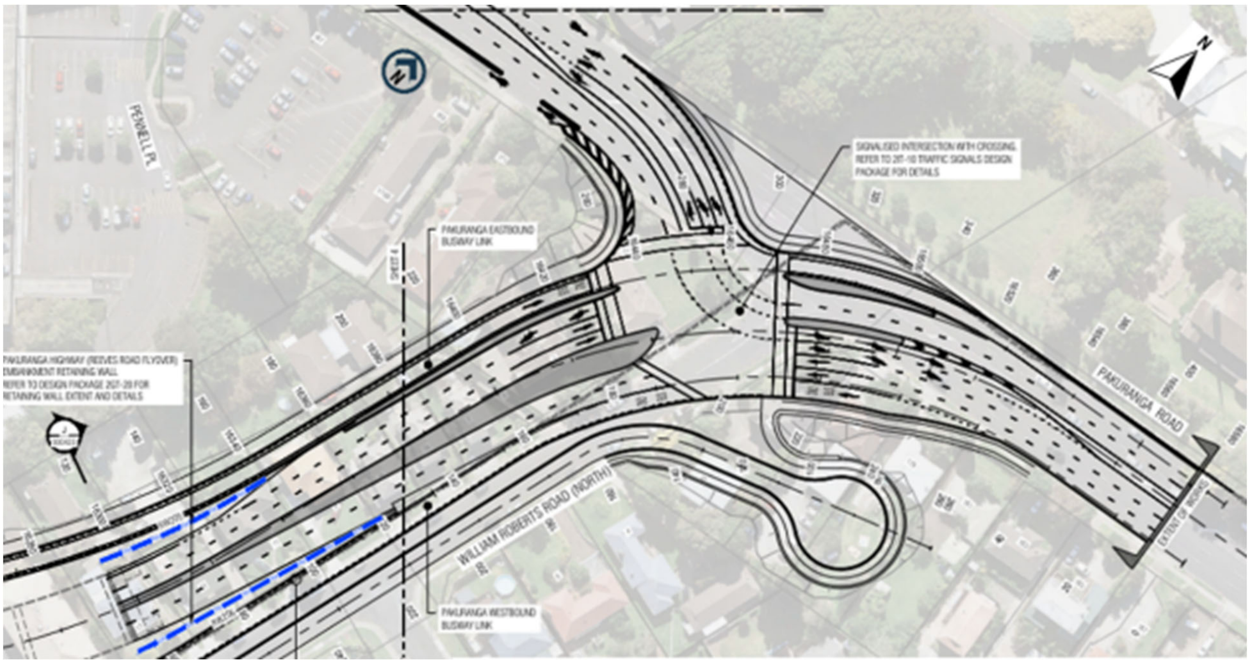



**Figure 31: Pakuranga Rd / RRF tie-in**

The tie-in of the RRF with Pakuranga Road will occur over four phases, maintaining five lanes of the Pakuranga Road carriageway at all times. Three lanes will be provided for the critical direction of traffic flow during the AM and PM peaks and two lanes for the opposite direction. This will be enabled by a dynamic lane arrangement. An example of the operation of dynamic lanes is shown in **Figure 32** below. It should be noted that this does not reflect the actual number of lanes on Pakuranga Road during construction.


**Figure 32: Example of dynamic lane operations**

**Figure 33** shows the indicative work zone of the Pakuranga Road tie-in works. The construction of the tie-in is anticipated to have a duration of approximately six months.


**Figure 33: Indicative work zone – Pakuranga Rd tie-in**

### *4.2.1.4 SEART*

In the future, the SEART off-ramp will consist of one short left-turn lane onto Ti Rakau Drive westbound, one short right-turn lane and two full length right-turn lanes onto Ti Rakau Drive eastbound. The SEART on-ramp will consist of two lanes to cater for the double left-turn from Ti Rakau Drive westbound.

**Figure 34** below shows the proposed layout of the SEART on-ramp and off-ramp at Ti Rakau Drive. The works along SEART will be divided into three phases.

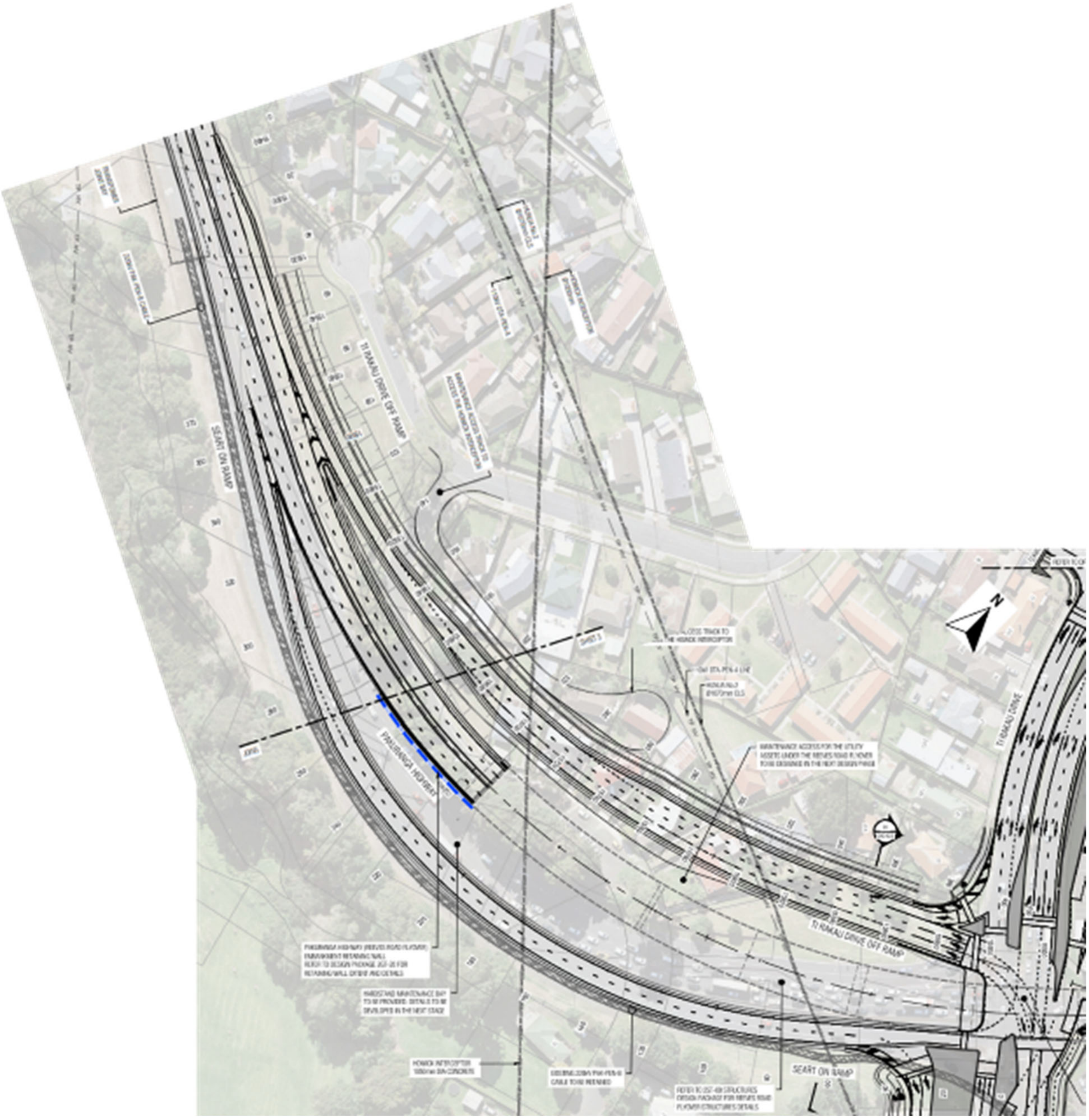



**Figure 34: SEART on-ramp and off-ramp at Ti Rakau Dr**

**Phase 1 – Eastbound Carriageway:**

The work associated with the eastbound carriageway will be offline between Ti Rakau Drive and Dale Crescent, on the northern side of SEART. Barrier protection will be installed along the existing shoulder up to the intersection with Ti Rakau Drive. To maintain the two left-turn lanes on the off-ramp, removal of the traffic island and temporary pavement will be required. Seven Oaks Drive will be reinstated further north of its current alignment.

**Phase 2 – Westbound Carriageway:**

During this phase the eastbound traffic will be moved to the new off-ramp. Westbound traffic will be transitioned to the existing eastbound lanes at the Ti Rakau Drive / Reeves Road intersection. This will allow for drainage works, permanent barrier removal and pavement construction on the existing westbound lanes. This phase of works will also consist of drainage works further west on SEART, which will be completed over night works with discrete closures.

**Phase 3 – Centre of Carriageway:**

Eastbound traffic will remain on the new off-ramp lanes from the preceding phases. Westbound traffic will be pushed to the southern edge of seal, maintaining the number of lanes as per the existing environment. A mixture of permanent and temporary barriers will protect the workspace.

A key component of this phase is construction of the falsework for the pier head above the Ti Rakau Drive right-turn lanes into SEART. Removal of the existing traffic island, including a streetlight and traffic signal pole, and construction of temporary pavement will be required to maintain the number of lanes as per the existing environment.

**Figure 35** below shows the indicative work zones for SEART. The works along SEART are anticipated to have a duration of approximately three years.


**Figure 35: Indicative work zones – SEART**

#### *4.2.1.5 Ti Rakau Drive*

The works along Ti Rakau Drive in the EB2 project area have been divided into two sections to provide a clear and concise description of the proposed design and construction methodology.

**Pakuranga Road to Reeves Road Section:**

Ti Rakau Drive between Pakuranga Road and Reeves Road will in future consist of two through lanes per direction and offline bus lanes on the northern side of the carriageway. The eastern approach of Ti Rakau Drive at the intersection with Pakuranga Road will consist of two full length left-turn lanes and one short right-turn lane.

The two intersections with Aylesbury Street will be combined into one crossroads intersection with Palm Avenue, providing for all movements in and out of the side roads and will be signalised. The western approach on Ti Rakau Drive will consist of a short left-turn lane, two full length through lanes and a short right-turn lane, while the eastern approach will consist of full length shared through and left-turn lane, a full length through lane and a short right-turn lane. The northern approach on Aylesbury Street will consist of left-turn lane and a shared through and right-turn lane. The southern Palm Avenue approach will remain as per the existing environment.

A bus station will be provided between Aylesbury Street and Reeves Road, while a 'Kiss-and-Ride' facility will be provided on the private access road off Aylesbury Street that will consist of six parking spaces. A bidirectional cycleway will also be provided on the northern side of Ti Rakau Drive which will tie into the existing bidirectional cycleway on Pakuranga Road west (part of EB1) and the new unidirectional cycleways on Pakuranga Road east.

A signalised shared pedestrian and cyclist crossing will be provided across the northern approach at the Pakuranga Road / Ti Rakau Drive intersection, with signalised pedestrian crossings on all other approaches. A raised table will be provided across the southern approach at the Ti Rakau Drive / Aylesbury Street / Palm Avenue intersection, a signalised shared pedestrian and cyclist crossing on the northern approach and signalised pedestrian crossings on all other approaches. At the Ti Rakau Drive / Reeves Road / SEART intersection a raised table will be provided across the northern approach, a signalised shared pedestrian and cyclist crossing on the eastern approach and signalised pedestrian crossings on the southern and western approaches. **Figure 36** below shows the proposed layout of Ti Rakau Drive between Pakuranga Road and Reeves Road.

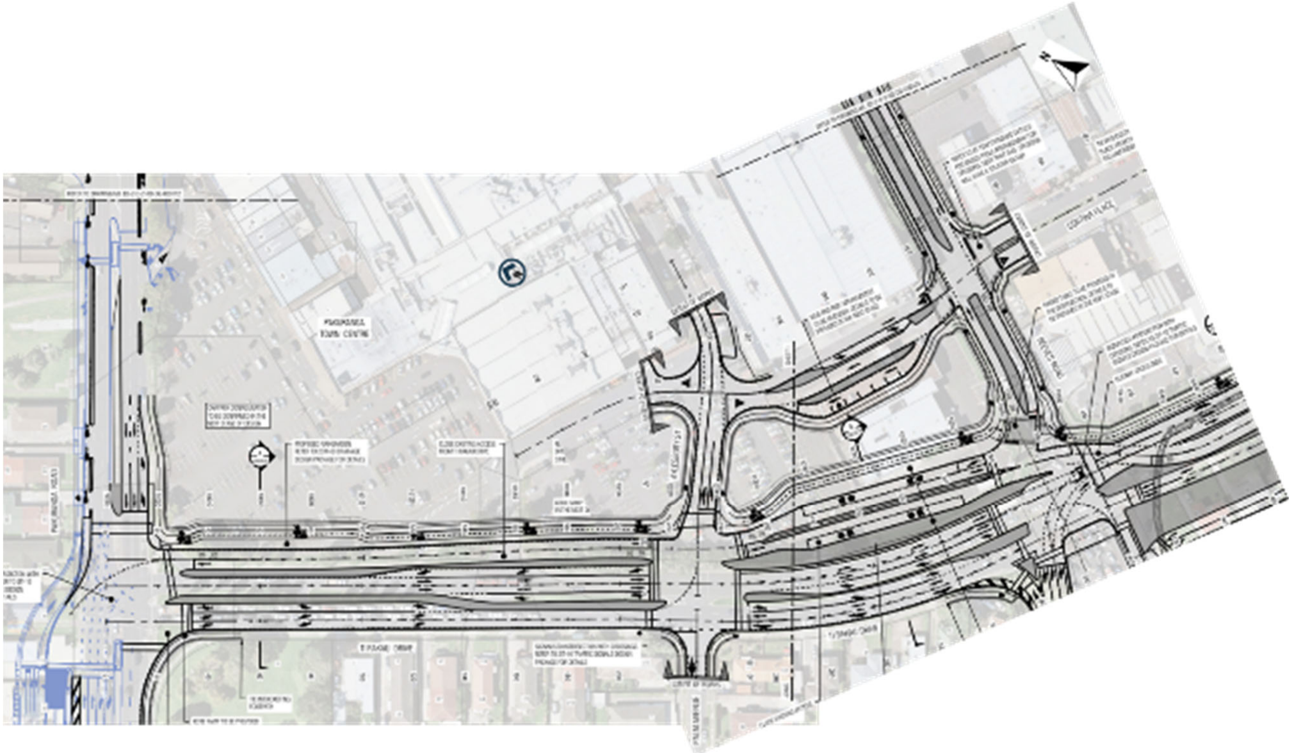


**Figure 36: Ti Rakau Dr from Pakuranga Rd to Reeves Rd**

The construction of Ti Rakau Drive between Pakuranga Road and Reeves Road will be divided into three sub-phases. In Phase 1, the new bus lanes are to be built largely offline concurrent with the RRF construction, and will include barrier protection, removal of the centre median and shifting lanes. Once the RRF is completed and traffic volumes have reduced on Ti Rakau Drive, the eastbound traffic will be transferred to the new bus lanes, reducing the available eastbound lanes to two lanes.

In Phase 2, works will commence in the centre of the carriageway to construct the new eastbound lanes. It is anticipated that insufficient width will be available to fully construct the median between the westbound and eastbound lanes in a single phase. Therefore, the northern section of the median will be constructed with the new eastbound lanes and the southern median section will be constructed with the westbound lanes.

Once the centre lane work is completed, barriers will be installed at minimal deflection in the centre lane separating the workspace from the westbound traffic in Phase 3. The southern section of the median spanning from Palm Avenue to Reeves Road will be constructed under discrete night closures once all pavement works, including the intersection works discussed below, have been completed.

**Figure 37** below shows the indicative work zones for Ti Rakau Drive from Pakuranga Road to Reeves Road. Construction of this section of Ti Rakau Drive is anticipated to have a duration of approximately three years.

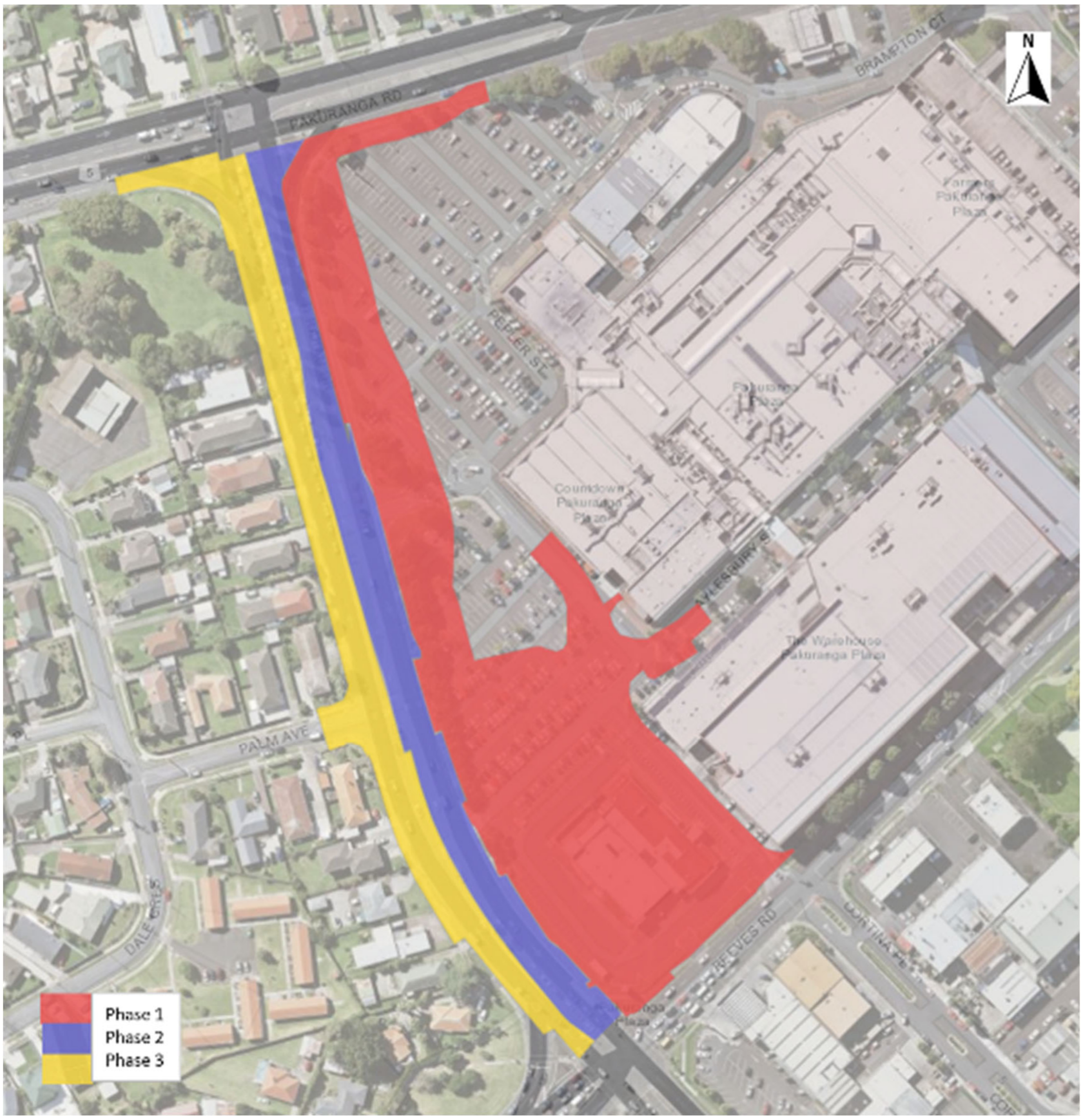



**Figure 37: Indicative work zones – Ti Rakau Dr from Pakuranga Rd to Reeves Rd**

**Ti Rakau Drive / Reeves Road Intersection:**

The Ti Rakau Drive / Reeves Road intersection will provide for the transition of offline bus lanes from the west to online or central running bus lanes to the east. The northern Reeves Road approach to the intersection will serve bus movements only up to Cortina Place, and will connect to the bus lanes to the west of the intersection. The western approach will provide two full length through lanes and one short right-turn lane. The eastern approach will provide one short left turn lane, one full length left-turn lane and two full length through lanes.

As stated in **Section 4.2.1.4**, the SEART off-ramp will consist of one left-turn lane and three right-turn lanes. The intersection will also provide for the transition of the bidirectional cycleway to unidirectional cycleways on both sides of Ti Rakau Drive to the east of the intersection. Again, a raised table will be provided across the northern approach, a signalised shared pedestrian and cyclist crossing on the eastern approach and signalised pedestrian crossings on the remaining approaches. **Figure 38** below shows the proposed layout of the Ti Rakau Drive / Reeves Road intersection underneath the RRF.

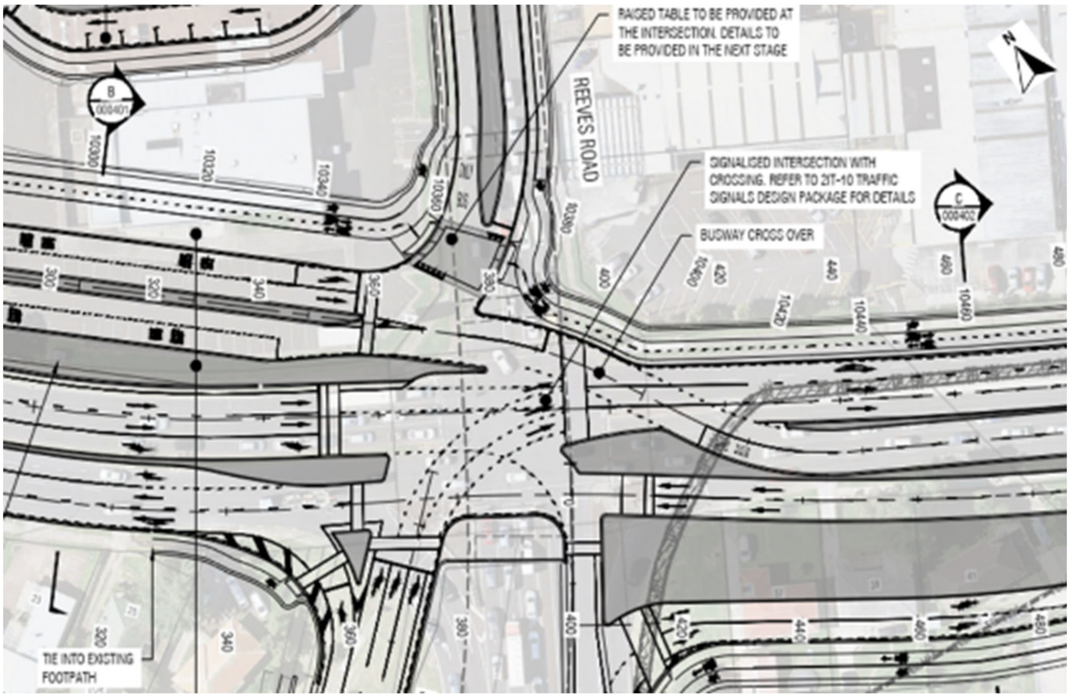



**Figure 38: Ti Rakau Dr / Reeves Rd intersection**

The construction of the Ti Rakau Drive / Reeves Road intersection will occur after Reeves Road and the RRF have been constructed. The intersection will be built in two sub-phases with Ti Rakau Drive being reduced to one lane each way for a short period (approximately one month). However, the works are also planned to occur during a ‘low traffic period’ (December to January) to mitigate the effects of the disruption.

**Figure 39** shows the indicative work zone of the Ti Rakau Drive / Reeves Road intersection.


**Figure 39: Indicative work zone – Ti Rakau Dr / Reeves Rd intersection**

#### *4.2.1.6 Pakuranga Road*

Pakuranga Road between Ti Rakau Drive and the RRF will consist of four lanes (two lanes per direction) with unidirectional cycleways on each side. The eastern approach of Pakuranga Road at the intersection with Ti Rakau Drive will consist of a short left-turn lane and two full length through lanes. As stated in **Section 4.2.1.3**, the western Pakuranga Road approach at the intersection with the RRF will consist of two full length left-turn lanes and one short right-turn lane.

The works associated with Pakuranga Road will involve converting the existing kerbside lanes to cycleways while retaining the existing footpaths along both sides. The existing signalised midblock pedestrian crossing on Pakuranga Road, constructed as part of EB1, will remain. **Figure 40** below shows the proposed layout of Pakuranga Road from Ti Rakau Drive to the RRF tie-in.

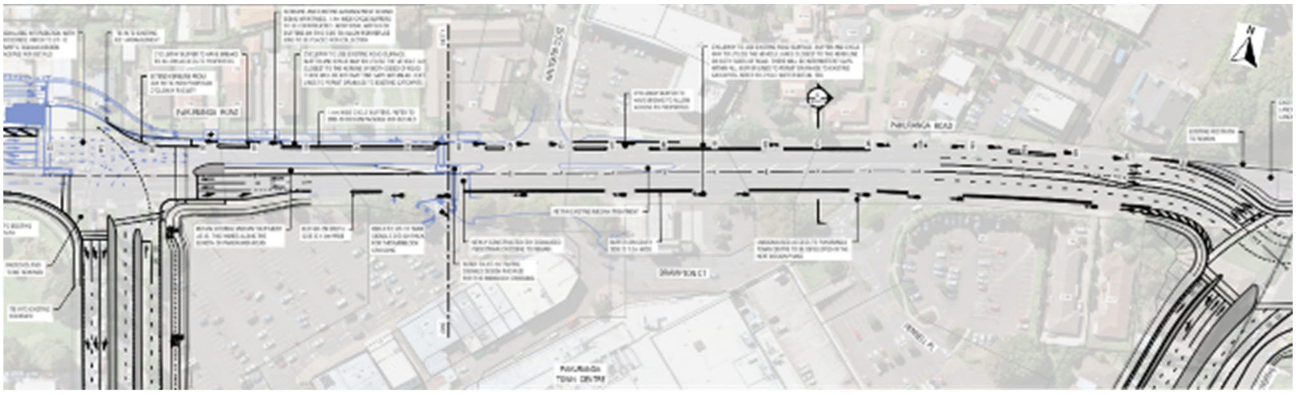


**Figure 40: Pakuranga Rd from Ti Rakau Dr to the RRF**

The initial stages of the Pakuranga Road construction will also include longitudinal and crossing drainage works. **Figure 41** shows the indicative work zone for Pakuranga Road. Construction works along Pakuranga Road are anticipated to have a duration of approximately six months.


**Figure 41: Indicative work zone – Pakuranga Rd**

### 4.2.2 EB3R – Design and Construction Works

The general extent of the EB3R project area encompasses the following roads (see **Figure 42**, yellow):

- Ti Rakau Drive from Reeves Road to the western Ti Rakau Bridge abutment
- Short sections of Tiraumea Drive, Mattson Road, Roseburn Place, Edgewater Drive west, Wheatley Avenue, Edgewater Drive east, Gossamer Drive and Freemantle Place

**Figure 42: EB3R general extent (yellow)**

Ti Rakau Drive in the EB3R section of the Project will largely consist of two lanes per direction, similar to the existing environment. Online bus lanes will be provided along the entire length of the corridor from Reeves Road to Gossamer Drive. For the purposes of this ITA the online bus lanes will terminate at the western approach of the Ti Rakau Drive / Gossamer Drive intersection. An intermediate bus station will be provided in the centre of the carriageway between Roseburn Place and Wheatley Avenue, and another intermediate bus station near the intersection with Gossamer Drive. A full set of EB3R layout drawings is provided in **Appendix C**.

### *4.2.2.1 Ti Rakau Drive – Reeves Road to Mattson Road*

This section of Ti Rakau Drive, between Reeves Road and Mattson Road, will consist of three lanes per direction. The westbound carriageway will reduce to two lanes near the intersection with Tiraumea Drive and the eastbound carriageway will reduce to two lanes near the Mattson Road intersection. Bus lanes will also be provided along the centre of the carriageway.

The Tiraumea Drive intersection will remain left-in left-out only, however, vehicles exiting from Tiraumea Drive will not be able to continue along Ti Rakau Drive. Instead, a diverge will be provided east of the intersection with the kerbside lanes heading towards SEART. Vehicles intending to head east or west along Ti Rakau Drive will do so from Mattson Road.

The intersections with William Roberts Road and Mattson Road will be arranged in a staggered-T formation. Both the William Roberts Road and Mattson Road approaches will consist of two lanes, a short left-turn lane and a full length right-turn lane. Both Ti Rakau Drive approaches to these intersections will consist of one full length shared through and left-turn lane and two full length through lanes. Each of the midblock approaches will consist of three full length through lanes and one short right-turn lane.

Unidirectional cycleways will be provided on each side of Ti Rakau Drive from Reeves Road in the west to Gossamer Drive in the east, in the EB3R project area. A signalised shared pedestrian and cyclist crossing will be provided on the northern approach at the Ti Rakau Drive / William Roberts Road intersection and a signalised pedestrian crossing on the western approach. At the Ti Rakau Drive / Mattson Road intersection a signalised shared pedestrian and cyclist crossing will be provided on the southern approach, while a signalised pedestrian crossing will be provided on the eastern approach. A raised table will be provided across Tiraumea drive. **Figure 43** shows the proposed layout of Ti Rakau Drive from Reeves Road to Mattson Road.

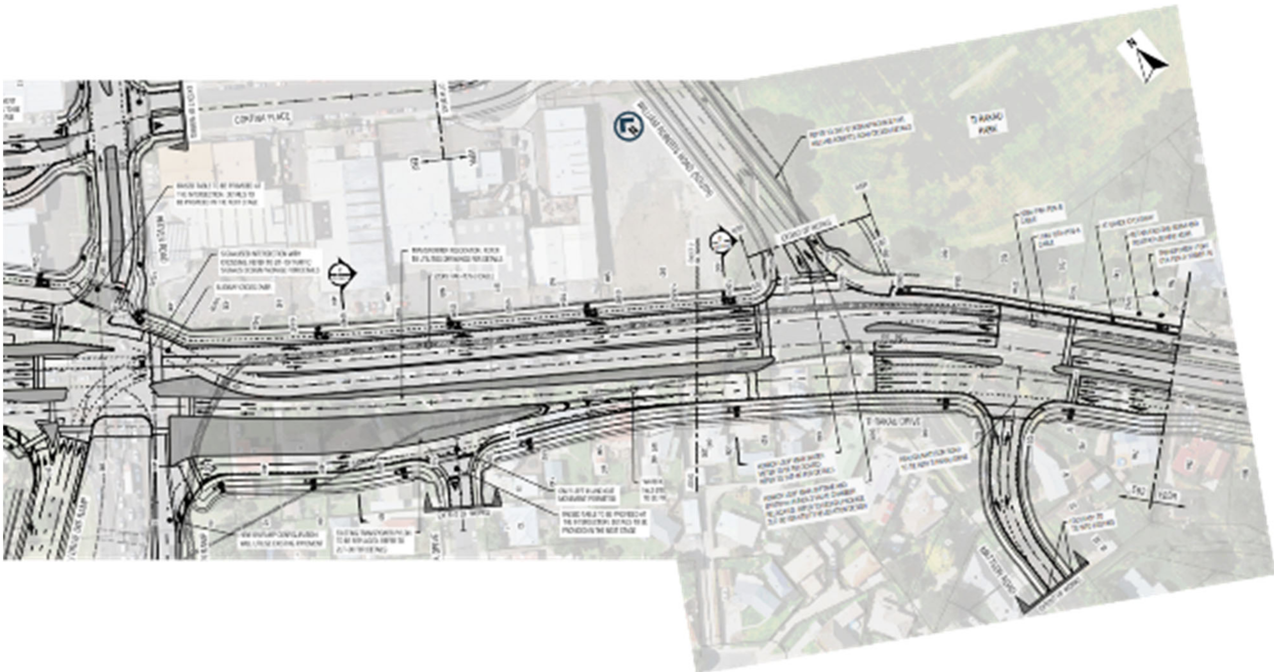


**Figure 43: Ti Rakau Dr from Reeves Rd to Mattson Rd**

The construction of this section of Ti Rakau Drive will be divided into six sub-phases and will for the majority of its duration occur during the Reeves Road closure. The first two phases will largely consist of offline works to construct the new westbound lanes on the acquired properties on the southern side of the carriageway. In addition, Phase 1 will include the construction of the Mattson Road intersection and Phase 2 will include the construction of the Tiraumea Drive intersection.

The next two phases will consist of works in the centre of the carriageway to construct the new bus lanes. Phase 3 and Phase 4 will include works to the west and east of Mattson Road, respectively. Phase 4 is predicted to be the 'worst-case' of this construction activity with regards to potential lane closures and traffic disruption.

Phase 5 will include further works in the centre of the carriageway to the west of William Roberts Road as well as works in the existing eastbound lanes to the east of William Roberts Road. Finally, Phase 6 will include works in the existing eastbound lanes to the west of William Roberts Road.

**Figure 44** shows the indicative works zones for Ti Rakau Drive from Reeves Road to Mattson Road. Construction of this section of Ti Rakau Drive is anticipated to have a duration of approximately one and a half years.


**Figure 44: Indicative work zones – Ti Rakau Dr from Reeves Rd to Mattson Rd**

### 4.2.2.2 Ti Rakau Drive – Mattson Road to Gossamer Drive

The intersections with Roseburn Place, Marriott Road, Edgewater Drive west and Chevis Place, Wheatley Avenue and Edgewater Drive east which currently provide for all movements in/out of the side roads, will be converted to LILO intersections. Two U-turn facilities will be provided along Ti Rakau Drive, one between Roseburn Place and Marriott Road for the westbound traffic and one between Edgewater Drive west and Wheatley Avenue for the eastbound traffic (see **Figure 45**).

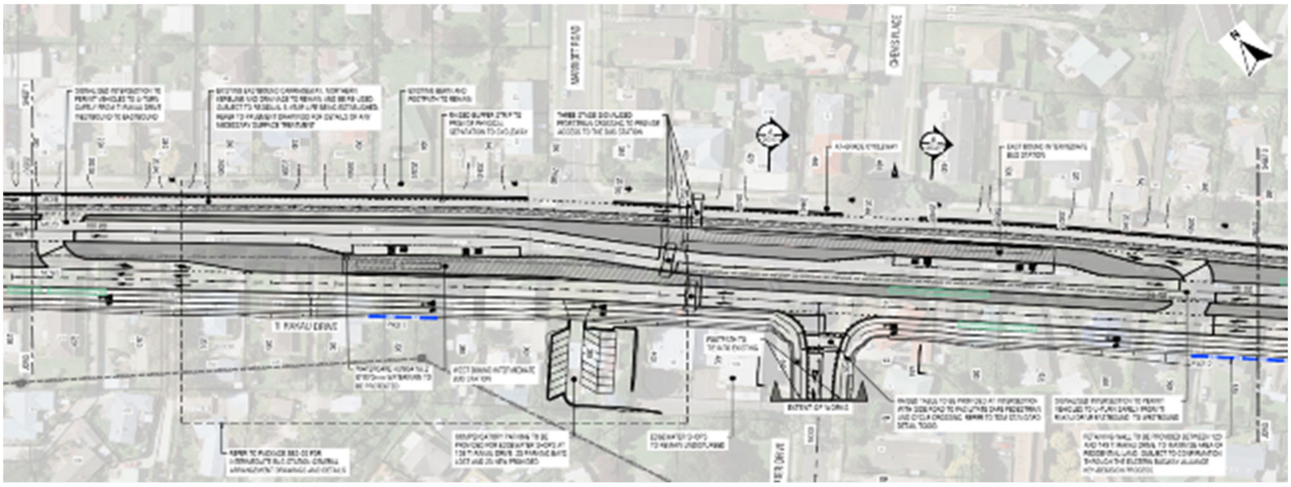


**Figure 45: Ti Rakau Dr between Roseburn Pl and Wheatley Ave**

Additionally, a U-turn manoeuvre will also be provided on the western approach at the Ti Rakau Drive / Gossamer Drive intersection. This is to provide access from Ti Rakau Drive eastbound into Edgewater Drive east, Wheatley Avenue and the properties on the southern side of Ti Rakau Drive between Edgewater Drive east and Freemantle Place.

A three-stage signalised pedestrian crossing will be provided, between Marriot Road and Edgewater Drive, to facilitate pedestrian access to the bus station from both sides of Ti Rakau Drive. Raised tables will be provided across Roseburn Place, Edgewater Drive west, Wheatley Avenue and Edgewater Drive east.

**Figure 46** below shows the proposed layout of the Ti Rakau Drive / Gossamer Drive intersection. The western approach will consist of a short left-turn lane, two full length through lanes and one shared right-turn and U-turn short lane. The eastern approach will consist of one full length shared through and left-turn lane, one full length through lane, one short bus queue-jump lane and two short right-turn lanes.

The eastbound bus lane will transition to the northern side of Ti Rakau Drive to the proposed bus stop, and taper back into Ti Rakau Drive before the Ti Rakau Bridge. The southern Freemantle Place approach will consist of a short left-turn lane and a full length shared through and right-turn lane. The northern Gossamer Drive approach will consist of one short and one full length left-turn lane, and a shared through and right-turn short lane.

A signalised shared pedestrian and cyclist crossing will be provided on the western approach at the Ti Rakau Drive / Gossamer Drive intersection, with signalised pedestrian crossings on all other approaches.

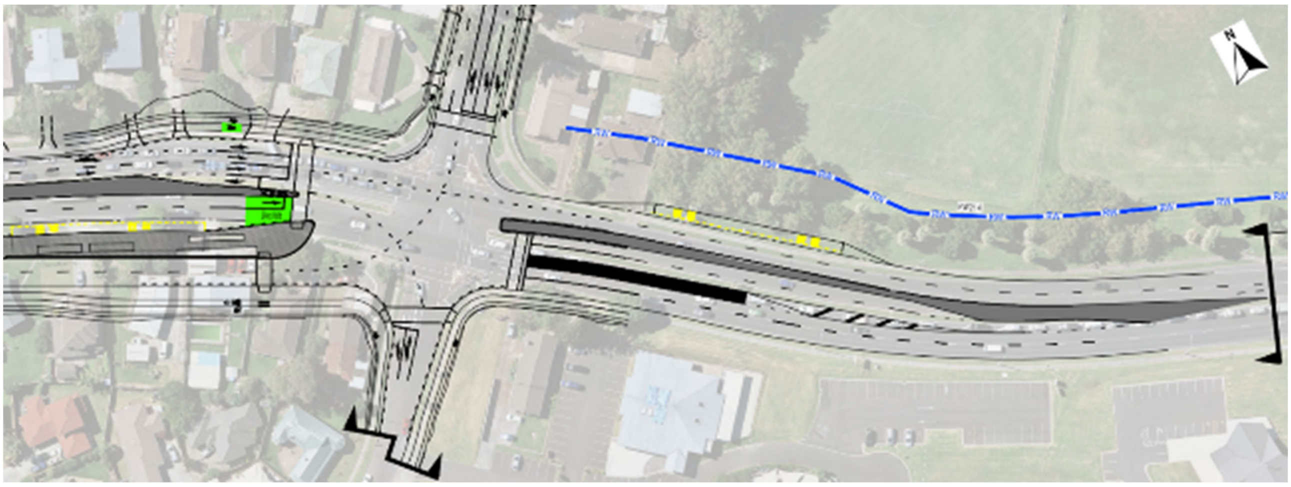


**Figure 46: Ti Rakau Dr at Gossamer Dr**

Throughout the construction of EB3R, the preferred methodology is to complete works offline to allow space to be provided for future lateral shifts of running lanes. The EB3R construction works between Mattson Road and Gossamer Drive are anticipated to occur over a period of approximately three years, and will be split into three main phases.

#### *4.2.2.3 Ti Rakau Drive – Mattson Road to Gossamer Drive (Phase 1)*

Phase 1 will involve constructing the new westbound lanes offline in the acquired properties along the southern side of Ti Rakau Drive and rebuilding pavement at intersections where the new busway intersects. This phase will be divided into six sub-phases, a summary of which is provided in **Table 16**.

**Table 16: EB3R Phase 1 construction summary**

| Sub-Phase | Summary of Activities |
|---|---|
| 1a-b | Construction of Roseburn Place in two sub-phases. |
| 1c | Edgewater Drive west in one sub-phase. |
| 1d-e | Wheatley Avenue in two sub-phases. |
| 1f | Edgewater Drive east in one sub-phase. |

The new westbound carriageway will consist of two lanes, similar to the existing environment. Establishing works will also be able to commence on the north-east quadrant of the Ti Rakau Drive / Gossamer Drive intersection to enable construction of the eastbound Gossamer Drive bus station to commence at any time.

**Figure 47** below shows the indicative work zones for Phase 1 of EB3R, and is anticipated to have a duration of approximately one year and three months.


**Figure 47: Indicative work zones – EB3R Phase 1**

The pavement type specified for design requires closures of specific roadway sections for periods of at least one week before being opened to general traffic.  These roadway sections have been divided into two categories with varying Temporary Traffic Management (TTM) approaches.

**Category 1 (Detour Loops) – Edgewater Drive west and east:**

The preferred approach to construct pavement through these intersections is to close one intersection at a time.  As Edgewater Drive is a loop with two accesses to Ti Rakau Drive, traffic will be detoured to one end of the loop enabling the other end to be closed and rebuilt.  The full closures are anticipated to reduce the overall time TTM will be required.

As above, Phase 1c will consist of the construction of the Edgewater Drive west intersection.  All traffic along Edgewater Drive will be diverted to the Ti Rakau Drive / Edgewater Drive east intersection.  A temporary traffic signal will be provided at this intersection to aid vehicles turning right into and out of Edgewater Drive.  Phase 1f will include the construction of the Edgewater Drive east intersection, and all traffic along this side road will be diverted to the existing traffic signal at Edgewater Drive west.

**Category 2 (Cul-de-sac Roads) – Wheatley Avenue and Roseburn Place:**

Two cul-de-sac roads are located along Ti Rakau Drive that enable residential property access. To maintain access through Wheatley Avenue and Roseburn Place intersections, the approaches will be constructed in halves with temporary traffic signals installed and set back from the works, creating a one-way system on the side roads. As above, these intersections will be constructed during sub-phases 1a-b and 1d-e, respectively.

To minimise disruption to the main road, vehicles entering the cul-de-sac will have right-of-way. Green phases for vehicles leaving the cul-de-sac roads will only be triggered on the basis of demand. Traffic volumes on the side roads are predicted to be low during both peak periods (see **Table 17**).

**Table 17: Ti Rakau Dr side road traffic volumes (2028)[20]**

| Side Road | Movement Out | AM Peak | PM Peak |
|---|---|---|---|
| Roseburn Pl | Left | 20 | 7 |
| | Right | 10 | 8 |
| | **Total** | **30** | **15** |
| Wheatley Ave | Left | 31 | 22 |
| | Right | 0 | 0 |
| | **Total** | **31** | **22** |

Approximately one vehicle every two minutes would require access onto Ti Rakau Drive from Roseburn Place and Wheatley Avenue during the peak periods. Improved performance is expected on the side roads as the temporary traffic signal control would improve the delay currently being experienced at the priority-controlled intersections.

#### *4.2.2.4 Ti Rakau Drive – Mattson Road to Gossamer Drive (Phase 2)*

Phase 2 will consist of the construction of the bus lanes in the centre of Ti Rakau Drive and will be divided into two sub-phases. The new bus lanes will tie into the EB2 bus lanes to the west and will terminate at Gossamer Drive to the east. The new Edgewater Drive bus station, the new westbound Gossamer Drive bus station and new U-turn facilities will also be constructed during this phase.

**Figure 48** below shows the indicative work zone for Phase 2 of EB3R (dark grey), and is expected to have a duration of approximately 11 months.

[20] Traffic volumes sourced from the WRRE AIMSUN model, with a 2028 horizon year.

**Figure 48: Indicative work zone – EB3R Phase 2**

**Phase 2a:**

During Phase 2a multiple right-turns across the workspace will require temporary removal, resulting in the intersections supporting LILO movements only.  This will occur at Roseburn Place, Marriott Road, Wheatley Avenue and Edgewater Drive east.

The intersection at Edgewater Drive west and Chevis Place will remain open during Phase 2a.  This intersection will also provide access into Roseburn Place to traffic travelling eastbound along Ti Rakau Drive via a new temporary U-turn movement on the western approach.  Similarly, a new temporary U-turn movement will also be provided on the eastern approach for traffic exiting from Wheatley Avenue and Edgewater Drive east intending to head east on Ti Rakau Drive.

Access into Wheatley Avenue and Edgewater Drive east, while travelling eastbound on Ti Rakau Drive, will also be provided via a U-turn movement on the western approach at the Ti Rakau Drive / Gossamer Drive intersection.  During Phase 2a this movement will be made permanent.  Access to Marriott Road from Ti Rakau Drive westbound will be maintained via a detour route along Gossamer Drive and Riverhills Avenue.

Phase 2a will also include the construction of the permanent U-turn facilities on Ti Rakau Drive near Roseburn Place and Wheatley Avenue, as well as the bus station near Edgewater Drive (see **Figure 45** above) and the westbound bus station at Gossamer Drive (see **Figure 46** above).

**Phase 2b:**

During Phase 2b the Edgewater Drive west / Chevis Place intersection will be converted to a LILO intersection to enable construction of that part of the carriageway. The new permanent U-turn facilities will provide access to all side roads from both directions of travel along Ti Rakau Drive except to Wheatley Avenue and Edgewater Drive east. Access to these two side roads will be maintained via the U-turn movement at the Ti Rakau Drive / Gossamer Drive intersection.

#### *4.2.2.5 Ti Rakau Drive – Mattson Road to Gossamer Drive (Phase 3)*

Phase 3 will consist of works in the existing eastbound lanes and will have some temporal overlap with Phase 2 as some sections are completed. This is due to Phase 3 works being completed under night works with discrete closures.

There is a large number of properties with driveways on the northern side of Ti Rakau Drive, meaning long term access will be required to allow vehicles to traverse through the site. As the pavement only requires resurfacing and not major reconstruction, this work will be completed in sections, with the road being trafficable during the daytime.

**Figure 49** shows the indicative work zones for Phase 3 of EB3R, and is anticipated to have a duration of approximately six months.


**Figure 49: Indicative work zones – EB3R Phase 3**

Phase 3 construction will also consist of works at the Ti Rakau Drive / Gossamer Drive intersection and will be divided into three sub-phases.

**Phase 3a:**

Phase 3a will include the construction of the western, northern and eastern approaches of the Ti Rakau Drive / Gossamer Drive intersection. The preferred construction method, without altering the pavement type or compromising on pavement quality, is a 'Blitz' approach. This approach will consist of closing access to Gossamer Drive, to enable the majority of the difficult to access areas to be completed.

Furthermore, Ti Rakau Drive will be reduced to one lane each way through the intersection. However, this approach has large programming risks and the effects to the traffic environment are dependent on the quality of communication with the public leading up to the closure. The works are also planned to occur during a 'low traffic period' (December to January) to mitigate the effects of the disruption.

For the purposes of this ITA, the construction of the Ti Rakau Drive / Gossamer Drive intersection was modelled as occurring simultaneously with the construction of the Ti Rakau Drive / Reeves Road intersection. These works will follow after the completion of Reeves Road and the RRF.

The southern Freemantle Place approach will be constructed under Phases 3b-c.

**Phase 3b-c:**

The southern Freemantle Place approach will be built in two sub-phases utilizing the 'Category 2 (Cul-de-sac Roads)' approach specified in Phase 1, see **Section 4.2.2.3**. Traffic volumes on the side road are predicted to be low during both peak periods (see **Table 18**).

**Table 18: Freemantle Pl traffic volumes (2028)[21]**

| Side Road | Movement Out | AM Peak | PM Peak |
|---|---|---|---|
| Freemantle Pl | Left | 23 | 12 |
| | Through | 9 | 2 |
| | Right | 18 | 18 |
| | **Total** | **50** | **32** |

Roughly one vehicle every minute would require access from Freemantle Place onto Ti Rakau Drive during the peak hours.

[21] Traffic volumes sourced from the WRRE AIMSUN model, with a 2028 horizon year.

# 5 Assessment of Temporary Effects during Construction

The sections below provide an assessment of the temporary effects during construction of EB2 and EB3R including:

- Construction effects
- General traffic effects
- Effects to bus services and facilities
- Effects to pedestrians and cyclists
- Effects to property access and parking
- Effects to safety performance

## 5.1 Construction Effects

### 5.1.1 Construction Support Areas and Site Access Points

Construction Support Areas (CSAs) and Site Access Points (SAPs) are anticipated to vary throughout the construction phases, shifting as sections of the roadway are completed. The sections below provide an overview of the effects of notable CSAs and SAPs within the EB2 and EB3R project areas.

#### *5.1.1.1 EB2 – 2 Cortina Place and 5 Reeves Road Site Offices*

The properties at 2 Cortina Place and 5 Reeves Road have been acquired by AT and will serve as site offices for the EB2 project area. Therefore, the current use of these properties will no longer exist in the future. It is envisaged that Site Office 1 at 5 Reeves Road will accommodate approximately 120 workstations and Site Office 2 at 2 Cortina Place will accommodate approximately 30 workstations at the peak of construction. Office hours for the site offices will be from 07:00 to 19:00. **Figure 50** shows the location of Site Office 1 and 2 in the EB2 project area.

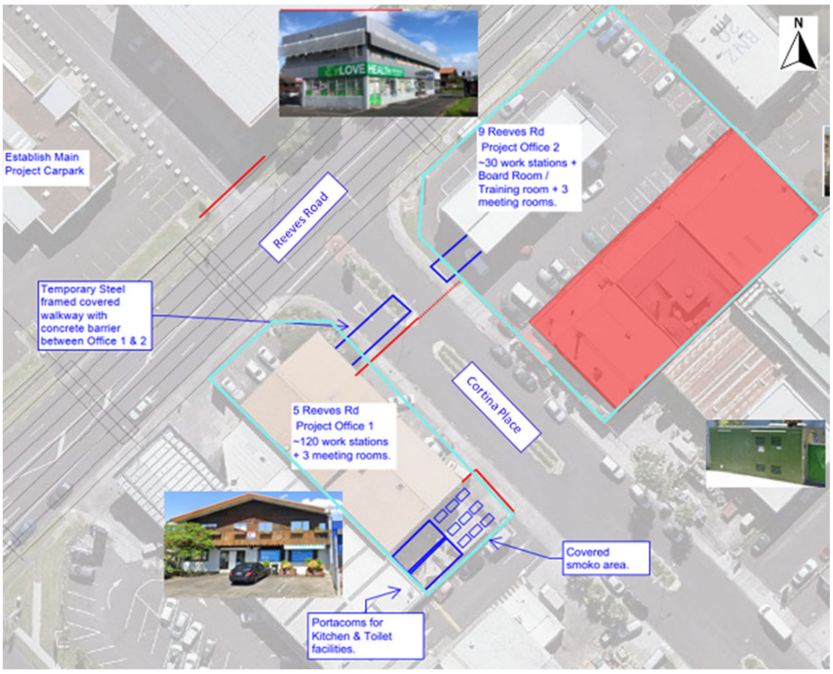



**Figure 50: Site Office 1 and 2 locations**

During the closure of Reeves Road, vehicle access to Site Office 1 from Reeves Road will not be maintained, although the property will still be accessible via Cortina Place. Pedestrian access to the property will be maintained at all times. Approximately 11 off-street parking spaces will be maintained on the eastern side of the property for visitors and deliveries.

The closure of Reeves Road will result in the loss of the access to Site Office 2 from the western frontage, however the property will still be accessible from Cortina Place. Pedestrian access to the property will be maintained at all times. The building in the centre of the property will be used as site office space, while the building along the eastern frontage of the property (red outline) will be demolished. Approximately five off-street parking spaces will be maintained on site and accessed from Cortina Place for material deliveries.

It is envisaged that, at least for the initial year of construction, site office staff will use public transport for commuter trips and will access the site offices on foot. Workforce Travel Management Plans will be developed to achieve this. The aim of the Workforce Travel Management Plans will be to reduce the number of private vehicles travelling to the worksites and to increase the accessibility of the worksites through more travel options. Therefore, the temporary traffic effects from the site offices in the first year are expected to be very low. Following the initial year and as construction activities ramp up, a staff carpark will be provided at 26 Ti Rakau Drive.

##### *5.1.1.2 EB2 – 26 Ti Rakau Drive Staff Carpark*

It is envisaged that the property at 26 Ti Rakau Drive will be acquired by AT and will serve partially as a site office staff parking area and partially as a work zone for the new Pakuranga Town Centre bus station during construction. The existing building and parking area on the property are not in use and therefore the Project will have no effects on the property from a transport perspective.

Once the existing infrastructure has been demolished and the work zone has been established, a temporary staff carpark will be established until the construction of the Kiss-and-Ride facility. For the purposes of this ITA it was assumed the staff carpark will provide 150 parking spaces, one parking space per workstation in Site Office 1 and 2. The property currently has no direct access from Ti Rakau Drive, and is accessed via Reeves Road and the internal road network inside the Pakuranga Plaza.

**Figure 51** below shows the location of the CSA to be located at 26 Ti Rakau Drive.


**Figure 51: 26 Ti Rakau Dr CSA location**

In the existing environment, the Pakuranga Plaza has six access points allowing for both in and out movements, with a seventh at Pepler Street allowing for movements out onto Pakuranga Road only. Throughout the construction programme of EB2, the accesses to Pakuranga Plaza will undergo several changes, some of which will be closed temporarily. Further details of effects to property access at the Pakuranga Plaza are provided in **Section 5.5.5.3**.

For the purposes of assessing the effects of the staff carpark, the 'worst-case' has been considered here, which will be during the Reeves Road closure. During this closure, access to this carpark will be gained via the three remaining accesses at Aylesbury Street north and south and at Brampton Court. It should be noted that the Pepler Street exit will also be open during this time.

As stated in **Section 5.1.1.1**, office hours for the site offices will be from 07:00 to 19:00, meaning a large proportion of site office staff is expected to travel on the road network outside of the AM and PM peaks. For the purpose of this ITA, assumptions were made to consider the staff carpark fully utilised and 50% of staff would be arriving/departing during the AM and PM peak hours, respectively.

Therefore, 150 parked vehicles, which would translate to 75 veh/h added to the traffic network and these vehicles would be accessing the Pakuranga Plaza from three access points during the peak hours. **Figure 52** below shows the background traffic volumes for both the AM and PM peak hours at these access points (PM traffic volumes in brackets).

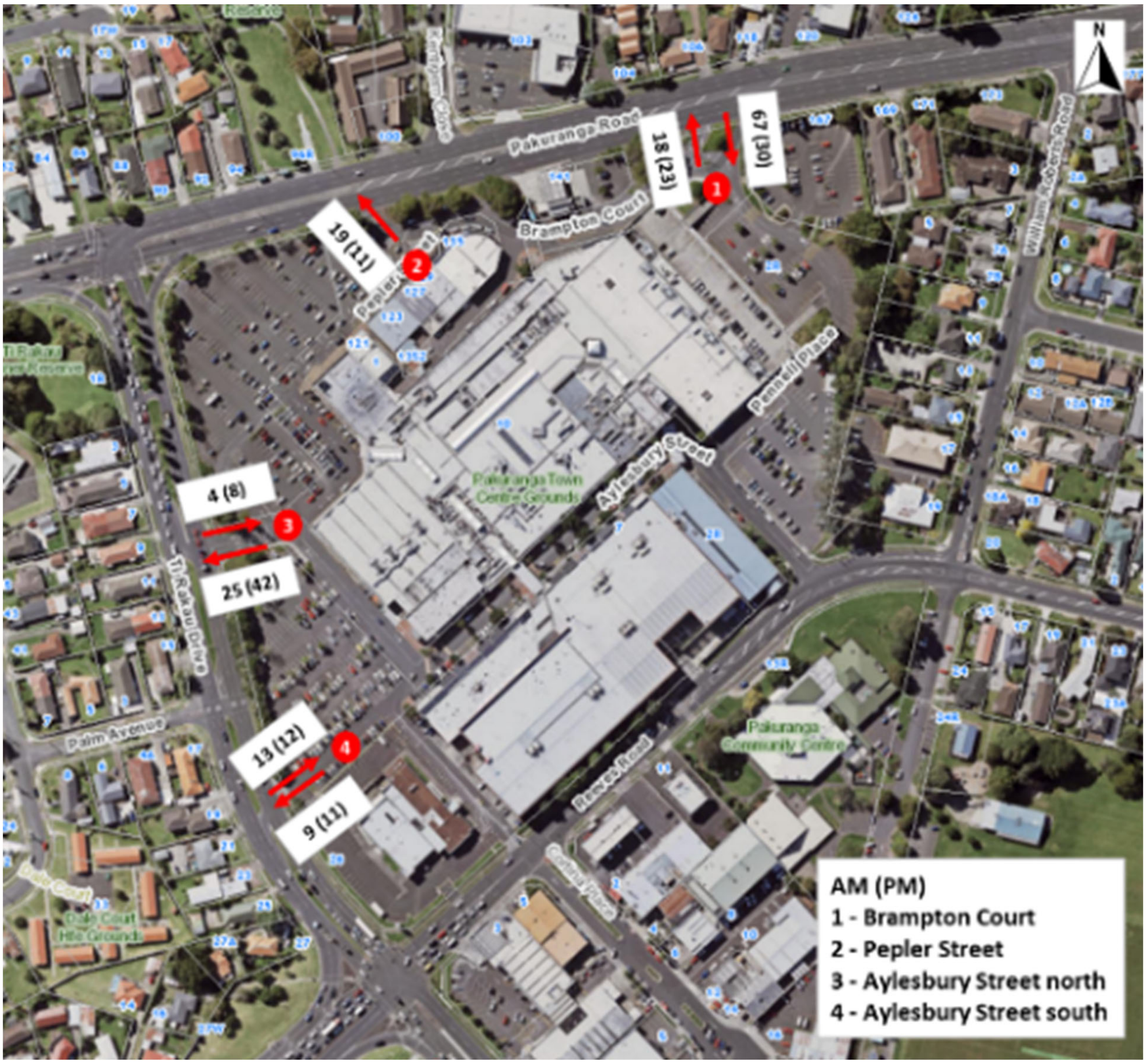



**Figure 52: Pakuranga Plaza background traffic volumes[22]**

The background traffic volumes on these access points are expected to be low during both the AM and PM peak hours. Furthermore, it would not be unreasonable to assume that the additional 75 veh/h would be distributed roughly evenly across these access points or to where the highest capacity is available. Therefore, the temporary effects of the staff carpark are expected to be very low.

[22] Traffic volumes sourced from the Do-Minimum AIMSUN model, with a 2028 horizon year.

### 5.1.1.3 EB2 – 2R Ti Rakau Drive Pennell Place CSA

During construction, the parking area off Pennell Place in the Pakuranga Plaza will be temporarily occupied and established as a CSA. **Figure 53** shows the location of the CSA.


**Figure 53: Pennell Pl CSA location**

The CSA will be used to support the construction of the RRF. In particular, it will be used to receive and pre-assemble the special Gantry (bespoke crane) to be used to lift and position the 'Super-T' beams. The CSA will also provide parking on site for specialist personnel and deliveries. The Pennell Place parking area will be occupied for approximately two years and two months.

Given the nature and operation of the CSA, general vehicle traffic volumes entering/exiting from the site are considered negligible. The operation and movement of the Gantry will be under strict construction traffic management control. Advance notice and appropriate public communication of such infrequent activities will be undertaken prior to these being initiated. This will be achieved through the Construction Traffic Management Plan (CTMP).

Therefore, the effects of the CSA on the transport network are expected to be very low. Effects to property access and parking at the Pakuranga Plaza due to the occupation are discussed in further detail in **Section 5.5.5.3**.

### *5.1.1.4 EB2 – William Roberts Road North Construction Yard*

A CSA will be located on the south-western quadrant of the Pakuranga Road / William Roberts Road intersection and will serve as a laydown area of materials and aggregates. This construction yard is subject to a separate resource consent application[23], but is mentioned here for completeness.

It is proposed that the Pakuranga Road / William Roberts Road intersection will be signalised temporarily. This will improve the capacity of the right-turn movements into and out of William Roberts Road and improve safety of turning across three lanes of through traffic. Further details on intersection performance are provided in **Section 5.2.2.5**.

### *5.1.1.5 EB2 – 14 Seven Oaks Drive Site Office / Laydown Area*

A site office / laydown area will be established at 14 Seven Oaks Drive for the construction of EB2. The property has been acquired by AT. As such, the current residential use of this property will no longer exist during construction or at completion, therefore the CSA will have no effects on this property.

**Figure 54** shows the location of the CSA to be located at 14 Seven Oaks Drive.

**Figure 54: 14 Seven Oaks Dr CSA location**

Access will be maintained off Seven Oaks Drive, utilizing the existing driveway. The existing house will be utilised as the office until de-construction of the structure is required. The site will be relatively small, and all parking requirements will be accommodated on site. The temporary effects of this contained site on the road network are expected to be negligible.

[23] LUCXXXX

#### 5.1.1.6 EB3R – 12 Bolina Cr, 143 Ti Rakau Dr and 178 Gossamer Dr Site Offices / Laydown Areas

Site offices / laydown areas will be established at 12 Bolina Crescent, 143 Ti Rakau Drive and 178 Gossamer Drive for the construction of EB3R. The properties have been acquired by AT. As such, the use of these properties will no longer exist during construction or at completion, therefore the CSAs will have no effects on these properties.

**Figure 55** shows the location of the CSA to be located at 12 Bolina Crescent.

**Figure 55: 12 Bolina Cr CSA location**

**Figure 56** shows the location of the CSA to be located at 143 Ti Rakau Drive.


**Figure 56: 143 Ti Rakau Dr CSA location**

**Figure 57** shows the location of the CSA to be located at 178 Gossamer Drive.


**Figure 57: 178 Gossamer Dr CSA location**

Access will be maintained off Bolina Crescent, Ti Rakau Drive and Gossamer Drive, utilizing the existing driveways. The existing houses will be utilised as offices until de-construction of the structures is required. The sites will be relatively small, and all parking requirements will be accommodated on site. The temporary effects of these contained sites on the road network are expected to be negligible.

### 5.1.2 Construction Vehicle Effects

The sections below provide details on the construction routes, construction traffic volumes, hours of operation and vehicle types. Thereafter, an assessment of construction vehicle effects is provided, split into sections of the EB2 and EB3R project areas.

#### *5.1.2.1 Construction Routes and Construction Traffic*

The construction routes in and around the EB2 and EB3R project areas are shown in **Figure 58.** At the time of writing, suppliers of construction materials had not been confirmed. Therefore, the most likely routes for construction vehicle movements to the project area from plant and material sites not in the immediate vicinity will be the main corridors of Ti Rakau Drive, Pakuranga Road and SEART (main external routes below). The figure also shows the construction yard at 169-173 Pakuranga Road and the 'internal material transfer routes' to be used by construction vehicles.

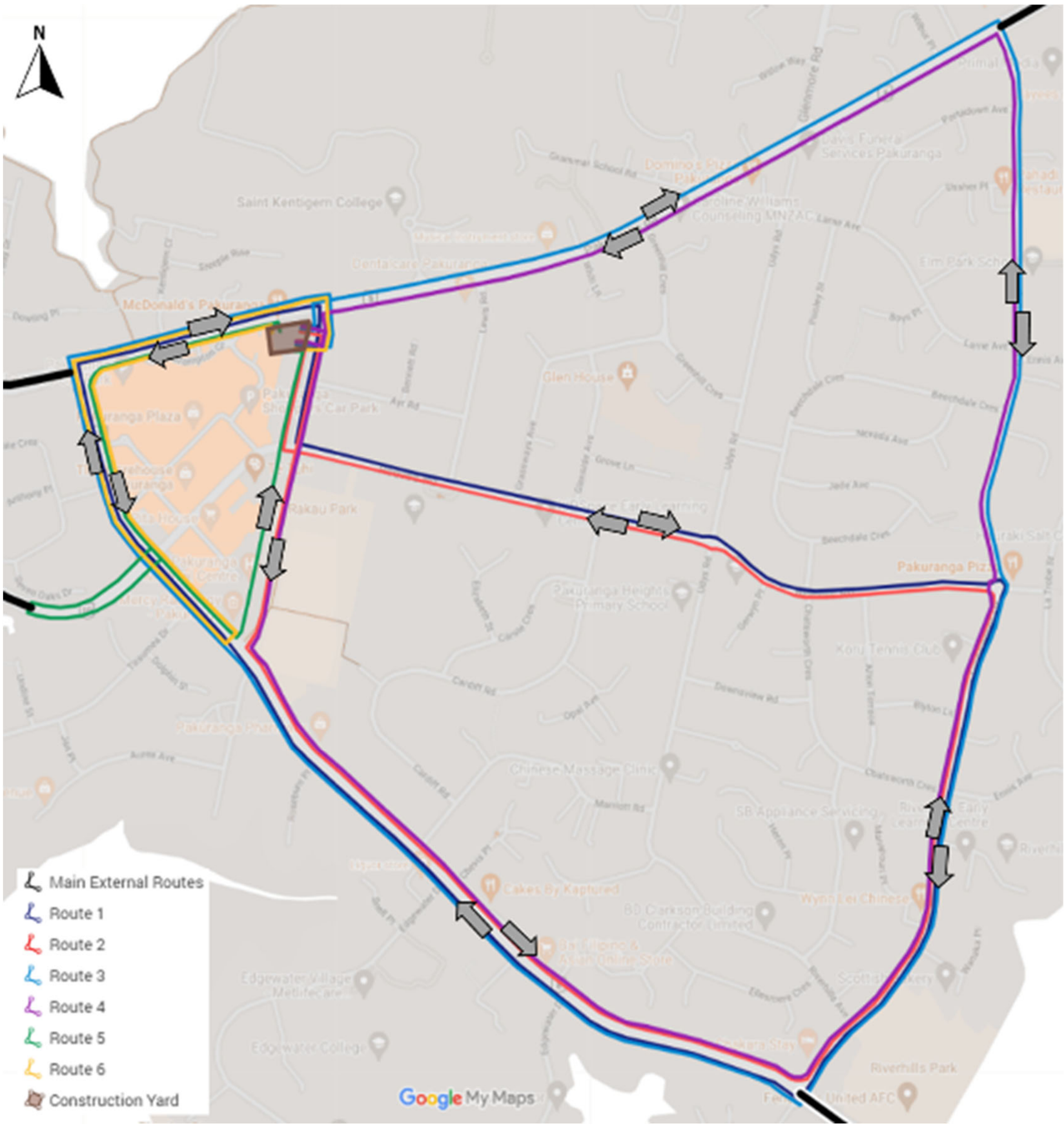



**Figure 58: Construction vehicle routes**

During EB2 and EB3R construction, roughly 50% of materials will be transported directly to the work zones from external supply yards as needed. The remaining 50% will be transported to the construction yard for storage until required. Construction material will be transported from the construction yard to the various work zones via six routes. **Table 19** below provides a description of each route as well as the anticipated number of vehicle movements. The number of vehicle movements also include the carting of demolition materials and excess spoil.

**Table 19: Construction route description and movements**

| Route | Construction Activity | Description | Vehicle Movements [veh/h] |
|---|---|---|---|
| Route 1 | EB3R Ti Rakau Dr westbound lanes (primary route) | Egress from the construction yard onto William Roberts Rd southbound, then Reeves Rd eastbound, Gossamer Dr southbound, Ti Rakau Drive westbound, Pakuranga Rd eastbound, William Roberts Rd southbound, return to construction yard. | 9 |
| Route 2 | EB3R Ti Rakau Dr eastbound lanes (primary route) | Egress from construction yard onto William Roberts Rd southbound, then Ti Rakau Dr eastbound, Gossamer Drive northbound, Reeves Rd westbound, William Roberts Road northbound, return to construction yard. | 10 |
| Route 3 | EB3R Ti Rakau Dr westbound lanes (secondary route) | Egress from construction yard onto William Roberts Rd northbound, then Pakuranga Rd eastbound, Gossamer Dr southbound, Ti Rakau Dr westbound, Pakuranga Rd eastbound, William Roberts Rd southbound, return to construction yard. | 8 |
| Route 4 | EB3R Ti Rakau Dr eastbound lanes (secondary route) | Egress from construction yard onto William Roberts Rd southbound, then Ti Rakau Dr eastbound, Gossamer Dr northbound, Pakuranga Rd westbound, William Roberts Road southbound, return to construction yard. | 9 |
| Route 5 | EB2 SEART | Egress from construction yard onto Pakuranga Rd westbound, then Ti Rakau Dr eastbound, SEART southbound, U-turn within work zone, SEART northbound, Ti Rakau Dr eastbound, William Roberts Rd northbound, return to construction yard. | 10 |
| Route 6 | EB2 Ti Rakau Dr | Egress from construction yard onto Pakuranga Rd westbound, then Ti Rakau Dr eastbound, U-turn within work zone, Ti Rakau Drive westbound, Pakuranga Road eastbound, William Roberts Rd southbound, return to construction yard. | 8 |

Route 1 will be the primary route for the construction of the Ti Rakau Drive westbound lanes with Route 3 as a secondary route in case of congestion or emergencies on Reeves Road. Similarly, Route 2 will be the primary route during the construction of the Ti Rakau Drive eastbound lanes, with Route 4 as a secondary route.

It should be noted that Route 1 and Route 3 will not be operating simultaneously with Route 2 and Route 4. This is due to the construction staging of Ti Rakau Drive in the EB3R project area. The new westbound lanes will be constructed first followed by the bus lanes in the centre and lastly the eastbound lanes.

##### *5.1.2.2 Vehicle Types*

It is anticipated that a range of vehicle sizes and types will be used for the construction activities within the EB2 and EB3R project areas. As stated above, roughly 50% of materials will be transported directly to the work zones as needed along the main external routes of Ti Rakau Drive, Pakuranga Road and SEART. The remaining 50% will be transported to the construction yard for storage until required. It is anticipated that 19m truck and trailers will be used for these activities. Materials from the construction yard will be transported to the various work zones via the six internal routes with smaller vehicles units such as 6-wheeler trucks.

Over-dimensional and over-weight deliveries are also expected; however, these will be infrequent, during low traffic periods such as night deliveries and will travel along appropriate routes such as arterial roads. The Ti Rakau Drive, Pakuranga Road and SEART corridors are well-suited to larger vehicles. Overall, the effects of these types of construction vehicles to the road network are expected to be negligible.

##### *5.1.2.3 Hours of Operation*

The vast majority of construction activities will be undertaken during ‘typical weekdays’ throughout the construction programme, as well as some weekends. Some construction activities will also be undertaken during lower traffic periods such as Easter and December holiday periods.

The general hours of operation for the construction activities and the construction routes will be from 07:00 to 18:00 on weekdays and 07:00 to 15:00 on Saturdays[24]. As such, construction vehicle movements will be balanced throughout the day, avoiding concentrations of construction traffic during the AM and PM peak hours. Therefore, the effects are expected to be very low.

It is anticipated that some night works will be undertaken to minimise the disruption to the public, businesses and traffic. Night works will be intermittent, and will not be continuous in a single location or activity for more than one month. These works will be controlled in part by the Project’s consent conditions and management plans[25].

The sections below provide an assessment of construction vehicle effects on specific sections of the road network within the EB2 and EB3R project areas.

[24] It should be noted that staff will begin arriving at site prior to construction start times and leave after construction end times.
[25] These management plans include the Construction Noise and Vibration Management Plan (CNVMP).

### *5.1.2.4 EB2 – William Roberts Road North*

This section provides an assessment of construction vehicle effects on William Roberts Road north, from Pakuranga Road to Reeves Road (see **Figure 59**).


**Figure 59: William Roberts Rd north construction vehicle effects**

The construction yard will be located on this section of roadway and will support the highest concentration of construction vehicles in the EB2 and EB3R project areas. At the peak of construction, William Roberts Road north is expected to carry an additional 20 veh/h northbound and 19 veh/h southbound. It should be noted that if Reeves Road is experiencing congestion or in case of an emergency, construction vehicles would be rerouted through Pakuranga Road, thereby reducing the construction vehicle traffic volumes on William Roberts Road.

In addition to the properties used by AT for the construction yard, all of the remaining properties on the western side of William Roberts Road north as well as 2 and 2A William Roberts Road on the eastern side have also been acquired and are flagged for demolition. Therefore, the demand for on-street parking along this section of road will be significantly reduced.

Pedestrian refuge islands are currently provided at both ends of William Roberts Road north to provide pedestrians with safe crossing opportunities.

Overall, the addition of the construction vehicles to William Roberts Road north will be roughly one vehicle every three minutes in each direction, on-street parking demand will be significantly reduced, and safe pedestrian crossing points are provided. Therefore, the effects are considered to be very low.

### *5.1.2.5 EB2 – William Roberts Road South*

This section includes William Roberts Road south, from Reeves Road to Ti Rakau Drive, once the WRRE is completed (see **Figure 60**).

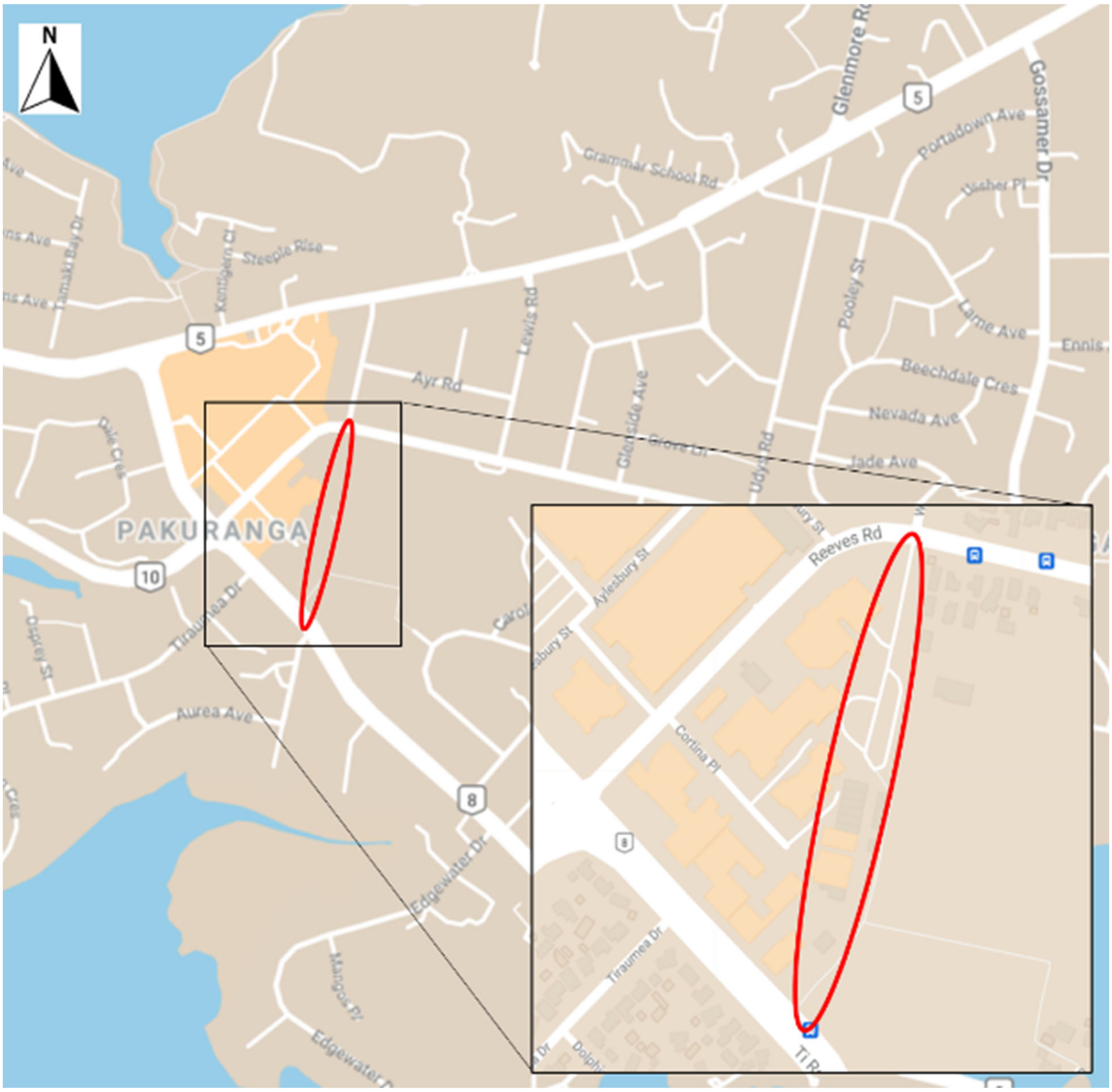



**Figure 60: William Roberts Rd south construction vehicle effects**

At the peak of construction, William Roberts Road south is expected to carry an additional 10 veh/h northbound and 10 veh/h southbound.

Some properties with vulnerable users such as the Pakuranga Leisure Centre, Barnardo's Early Learning Centre, Ti Rakau Park, and Dementia Auckland are located along this section of road. **Figure 61** below shows the location of these community and educational facilities.


**Figure 61: William Roberts Rd south community and education facilities**

However, once the William Roberts Road extension is completed, a low-speed environment will be created through a combination of the raised William Roberts Road / Cortina Place intersection, the raised pedestrian crossing near Ti Rakau Park and a 30 km/h posted speed limit. Furthermore, pedestrians will also be provided with safe crossing points at the Ti Rakau Drive / William Roberts Road and the William Roberts Road / Cortina Place intersections.

Nevertheless, appropriate community engagement will be undertaken to raise awareness of the increase in construction vehicles that will pass through the area. Construction vehicle drivers will also be briefed on these properties so that additional caution is employed when driving through the area. This will be achieved through the CTMP.

Overall, William Roberts Road is expected to carry roughly one construction vehicle every six minutes northbound and southbound, and a combination of speed calming features will create a low-speed environment. Therefore, the effects are considered to be very low.

### 5.1.2.6 EB2 – Reeves Road

This section includes Reeves Road from William Roberts Road in the west to Gossamer Drive in the east (see **Figure 62**).

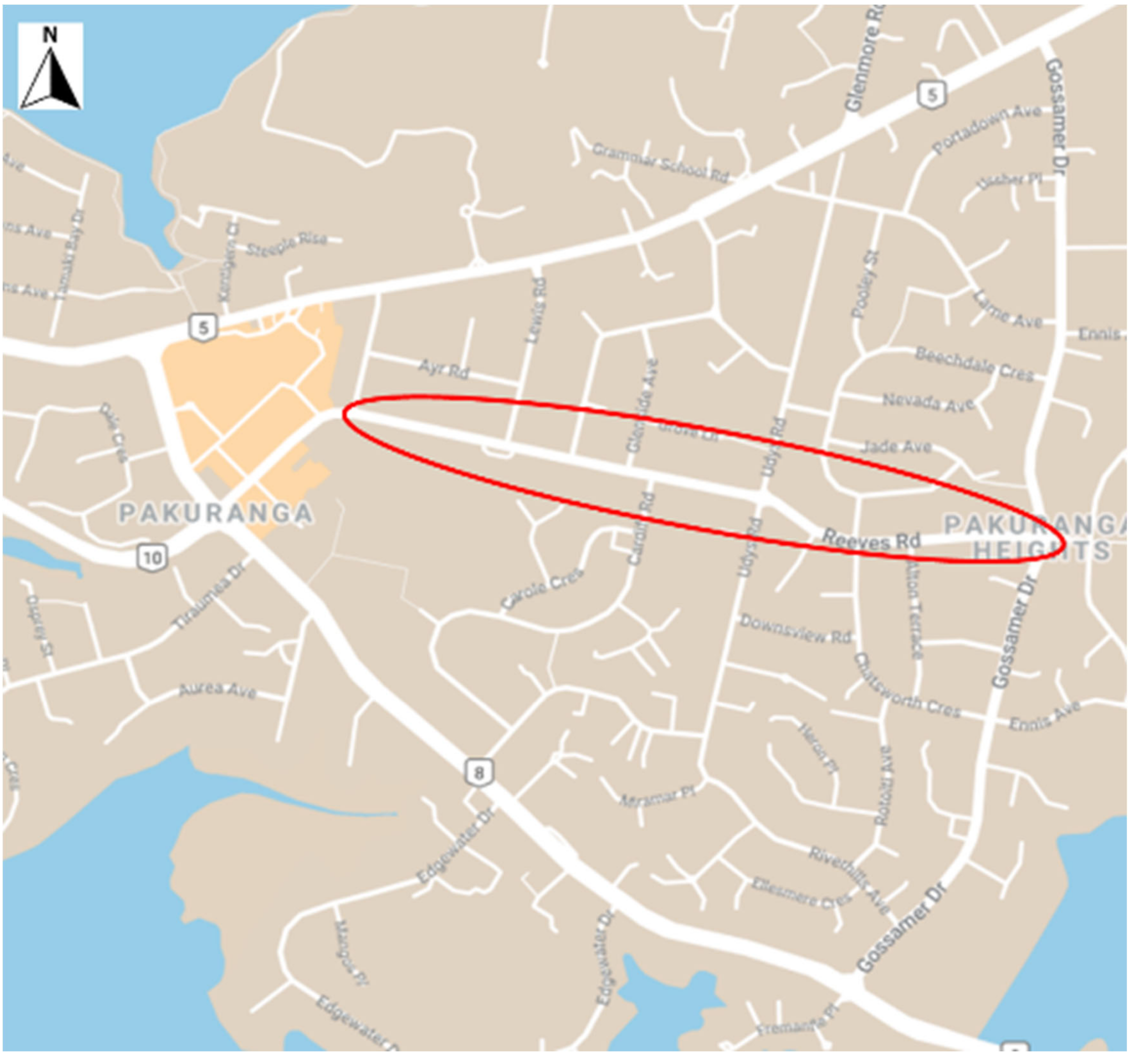



**Figure 62: Reeves Rd construction vehicle effects**

During construction of the Ti Rakau Drive westbound and eastbound lanes, Reeves Road will support an additional 9 veh/h in the eastbound direction and 10 veh/h in the westbound direction, respectively. It should be noted that these two construction phases will not occur simultaneously.

Reeves Road, in the existing environment, serves as a through route between Pakuranga Town Centre and Pakuranga Heights. As such, the carriageway consists of 4.4 m wide lanes and a 1.8 m flush median along the entire length. It also serves as a bus route for the 711 service.

In the existing environment there are three educational facilities that front Reeves Road, which will experience an increase in heavy vehicle traffic volumes. The Pakuranga Intermediate School, KIDSpace Early Learning Centre Pakuranga, and the Pakuranga Kindergarten are educational facilities with vulnerable users, and all have direct access off Reeves Road in the existing environment. The locations of these facilities are shown in **Figure 63** below.


**Figure 63: Reeves Rd education facilities**

The users of the facilities are, however, currently provided with ample and safe crossing facilities. Pedestrians are provided with a signalised pedestrian crossing outside the Pakuranga Intermediate School, and a pedestrian crossing near Cardiff Road for users of the KIDSpace Early Learning Centre. An uncontrolled pedestrian crossing is located near Gerwyn Place outside the Pakuranga Kindergarten; however, a pedestrian refuge island is provided here to facilitate a staged crossing if required.

Nevertheless, appropriate community engagement will be undertaken to raise awareness of the increase in construction vehicles that will pass through the area. Construction vehicle drivers will also be briefed on these properties so that additional caution is employed when driving through the area. This will be achieved through the CTMP.

Overall, Reeves Road will carry roughly one construction vehicle every six minutes either in the westbound or eastbound directions at the peak of construction. Furthermore, Reeves Road consists of a wide carriageway which supports larger sized vehicles in the existing environment and multiple safe pedestrian crossing points are provided. Therefore, the effects are considered to be very low.

#### 5.1.2.7 EB2 – Pakuranga Road

This section includes Pakuranga Road from Ti Rakau Drive in the west to William Roberts Road in the east (see **Figure 64**).


**Figure 64: Pakuranga Rd construction vehicle effects**

At the peak of construction Pakuranga Road is expected to carry an additional 17 veh/h eastbound and 18 veh/h westbound.

Pakuranga Road is an arterial road, and will for the majority of the construction period consist of three lanes per direction. Multiple bus services run along this road and as such Pakuranga Road is well-suited to larger sized vehicles. Signalised pedestrian crossings are also provided at the Ti Rakau Drive / Pakuranga Road intersection and the Pepler Street exit from Pakuranga Plaza.

Overall, Pakuranga Road will carry roughly one construction vehicle every three minutes eastbound and westbound at the peak of construction. Furthermore, Pakuranga Road is an arterial route supporting large vehicles in the existing environment and multiple safe pedestrian crossing points are provided. Therefore, the effects are considered to be negligible.

### 5.1.2.8 EB2 – SEART

This section includes SEART from Ti Rakau Drive to the southern abutment of the RRF, see **Figure 65**.


**Figure 65: SEART construction vehicle effects**

During construction of the RRF southern abutment, construction vehicles will enter onto SEART turning right from the western Ti Rakau Drive approach and will gain access to the work zone from the on-ramp. A 180˚ turn will be executed within the work zone, allowing construction vehicles to exit back onto the SEART off-ramp. Construction vehicles will head back to the construction yard by turning right onto Ti Rakau Drive.

At the peak of construction, the SEART on-ramp and off-ramp are expected to carry an additional 10 veh/h each, which translates to one construction vehicle every six minutes. Therefore, the effects are considered to be negligible.

### *5.1.2.9 EB2 and EB3R – Ti Rakau Drive*

This section includes Ti Rakau Drive between Pakuranga Road to SEART (Section 1) and SEART to Gossamer Drive (Section 2), see **Figure 66**.

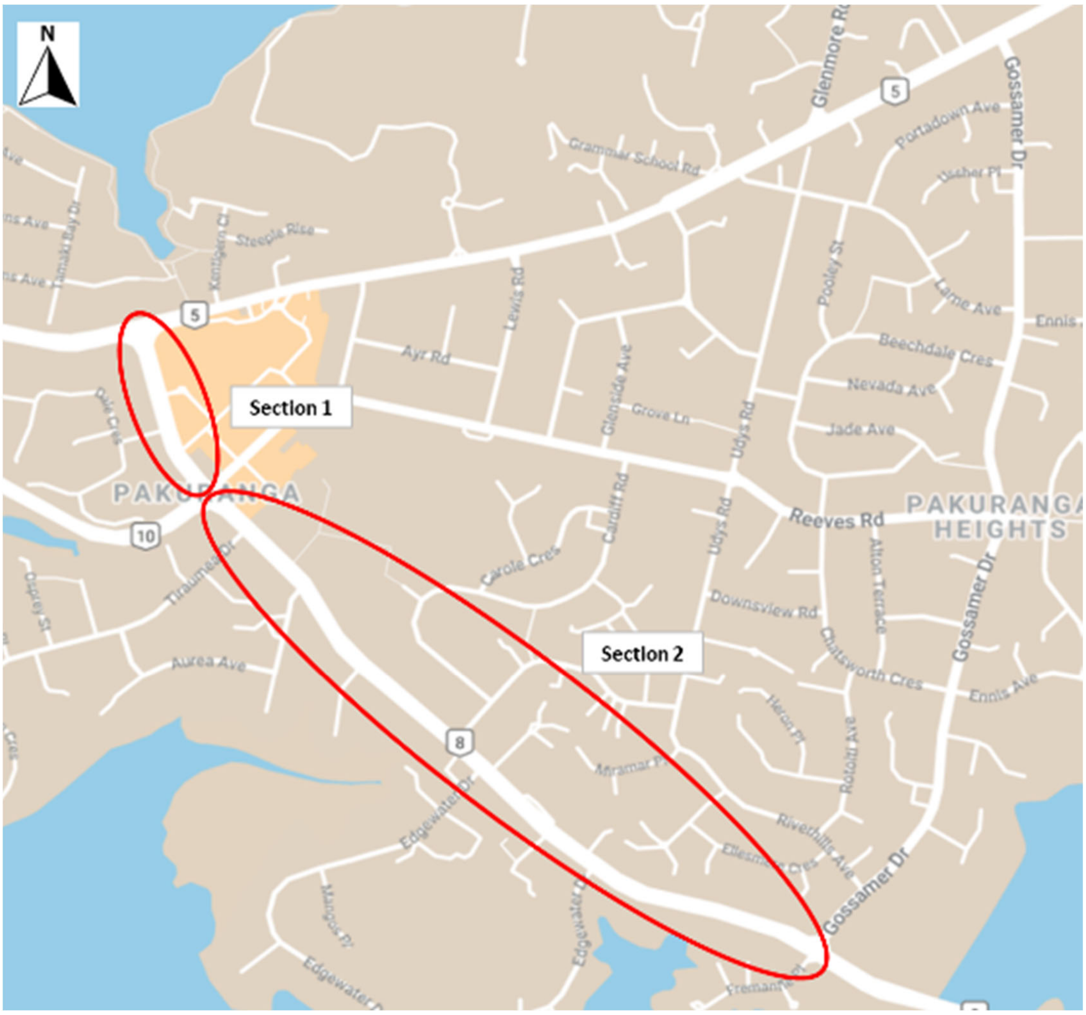



**Figure 66: Ti Rakau Dr construction vehicle effects**

Section 1 is expected to carry an additional 17 veh/h westbound and 18 veh/h eastbound at the peak of construction, while Section 2 is expected to carry an additional 9 veh/h westbound and 10 veh/h eastbound, respectively. It should be noted that the westbound and eastbound directions of Section 2 will not be loaded simultaneously as described above.

Ti Rakau Drive is an arterial road, and will for the majority of the construction period consist of two lanes per direction. Multiple bus services currently run along this road and as such is well-suited to larger sized vehicles. Signalised pedestrian crossings are provided at Pakuranga Road, Reeves Road, Mattson Road, Edgewater Drive west and Gossamer Drive.

Overall, Ti Rakau Drive will carry roughly one construction vehicle every three minutes westbound and eastbound at the peak of construction. Furthermore, Ti Rakau Drive is an arterial route supporting large vehicles in the existing environment and multiple safe pedestrian crossing points are provided. Therefore, the effects are considered to be negligible.

### *5.1.2.10 EB3R – Gossamer Drive*

This section includes Gossamer Drive from Ti Rakau Drive in the south to Reeves Road in the north (see **Figure 67**).

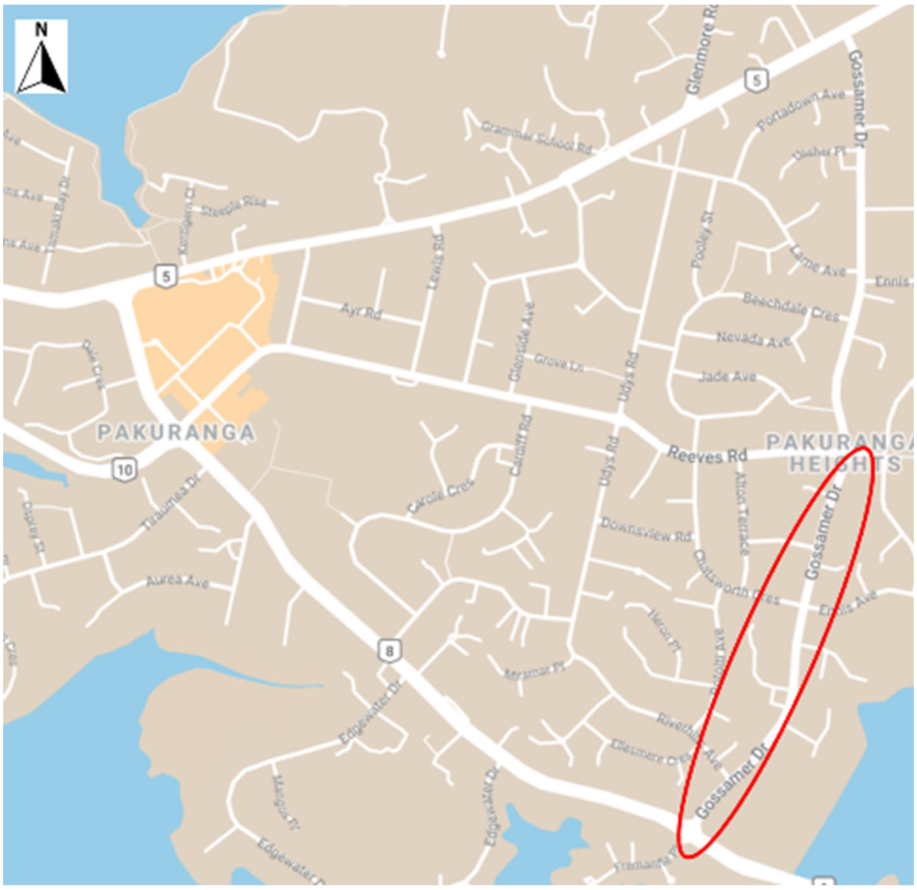



**Figure 67: Gossamer Dr construction vehicle effects**

During the construction of the Ti Rakau Drive westbound and eastbound lanes, Gossamer Drive will support an additional 9 veh/h southbound and 10 veh/h northbound, respectively. It should be noted that these two construction phases will not occur simultaneously.

Gossamer Drive, in the existing environment, serves as a through route between Ti Rakau Drive and Pakuranga Road. As such, the carriageway consists of 4.0 m wide lanes. Gossamer Drive is also a school bus route.

In the current environment, pedestrians are provided with a signalised pedestrian crossing at the Ti Rakau Drive / Gossamer Drive intersection and a pedestrian crossing near Chatsworth Crescent. In addition, all approaches to the Gossamer Drive / Reeves Road roundabout are provided with pedestrian refuge islands to facilitate a staged crossing if required.

Overall, Gossamer Drive will carry roughly one construction vehicle every six minutes either in the northbound or southbound directions at the peak of construction. Furthermore, Gossamer Drive consists of a wide carriageway which supports larger sized vehicles in the existing environment and multiple safe pedestrian crossing points are provided. Therefore, the effects are considered to be negligible.

### 5.1.3 Summary of Temporary Construction Effects

Overall, the temporary effects of the various CSAs that will be established as well as the construction traffic in the EB2 and EB3R project areas will be mitigated appropriately and are considered to be negligible or very low.

A Workforce Travel Management Plan will be developed to reduce the number of private vehicles travelling to the worksites and to increase accessibility of the worksites through more travel options.

CTMPs will be developed for the Project to avoid, remedy or mitigate the adverse effects of construction on transport, parking and property access so far as is reasonably practicable. The CTMPs will be developed in accordance with the conditions of consent and will include management strategies, controls and reporting protocols to achieve this.

Hours of operation, especially night works, will be controlled in part by the Project's consent conditions and management plans, including the CNVMP.

## 5.2 General Traffic Effects

The sections below provide an assessment of effects to general traffic during construction. General traffic effects refer to the movement of traffic across the road network as a whole. An assessment at a network-wide level, provides a better understanding as to the wider traffic effects of the Project and is based on the results from various AIMSUN and SIDRA traffic modelling assessments[26].

As stated in **Section 2.3**, Auckland's transport networks are constantly changing, undergoing improvements from new initiatives and being optimised. Furthermore, the global COVID-19 pandemic dramatically affected travel patterns and behaviours, and uncertainty remains that these effects would continue into the future. Given these factors, careful consideration was given to determine what formed the "existing environment".

For the purposes of the scenarios employed by the traffic modelling and this assessment, the existing environment was based on pre COVID-19 travel behaviours and a number of committed transport projects (including EB1 and WRRE Works) as well as the EB2/EB3R enabling works. Furthermore, a conservative approach was followed, whereby a 2028 future year was used to compare a Do-Minimum (without project) scenario and the EB2/EB3R scenarios. This approach allowed for the direct comparison between scenarios.

### 5.2.1 Construction Traffic

As stated in **Section 5.1.2**, the effects of the low estimated construction traffic volumes are expected to be negligible or very low and will be catered for within the existing road network. Therefore, a separate modelling assessment of the 'Do-Minimum' and 'Do-Minimum + Construction Traffic' scenarios on the entire network was not considered necessary.

### 5.2.2 Intersection Performance during Construction

#### *5.2.2.1 Overview of Performance Criteria and Modelling Scenario Development*

Intersection performance analyses were undertaken, using SIDRA, of the transport network comprised of selected intersections in the EB2 and EB3R project areas. The analyses consisted of a comparison between the Do-Minimum and EB2/EB3R scenarios for both the AM and PM peak hours. The performance criteria for the assessment were based on the Level of Service (LOS), degree of Saturation (DOS) or v/c ratio and delay in seconds. The LOS is a measure of the average delay at an intersection and is a function of the intersection control (see **Table 20** below).

[26] These assessments were undertaken in accordance with the methodology set out in **Section 2.4**.

**Table 20: Level of Service for intersections**

| Level of Service | Control Delay (d) for Buses, Freight and General Traffic |
|---|---|
| | Signalised intersections |
| A | d < 10 sec |
| B | 10 < d <= 20 sec |
| C | 20 < d <= 35 sec |
| D | 35 < d <= 55 sec |
| E | 55 < d <= 80 sec |
| F | d > 80 sec |

It should be noted that SIDRA cannot produce an overall intersection performance LOS for priority-controlled intersections. This is due to some approaches at priority-controlled intersections being uncontrolled, i.e., free flow, hence no control delay. As per the Transport Minimum Requirements guiding the design of the Project, overall intersection performance of LOS E or better for signalised intersections, with regards to general traffic, was considered acceptable throughout this ITA.

The DOS is a measure of utilisation of the capacity of the intersection between 0 and 1, based on the traffic load forecast for the intersection. In SIDRA, the DOS is reported by turn movements based on the traffic load divided by the calculated capacity. At signalised intersections, the calculated capacity considers the signal phase times and the effective green time for any particular turn movement. The overall intersection DOS metric is based on the maximum reported DOS for any movement within the intersection.

The traffic modelling undertaken in this ITA considered the ‘worst-case’ scenarios to determine the temporary effects during construction. The temporary effects were modelled in three separate construction scenarios to simulate the expected traffic distribution that could occur due to significant changes in the road network.

**Figure 68** provides a simplified schematic of the construction activities that informed the development of the construction scenarios assessed in this ITA. It should be noted that activity duration should not be interpreted from this schematic.

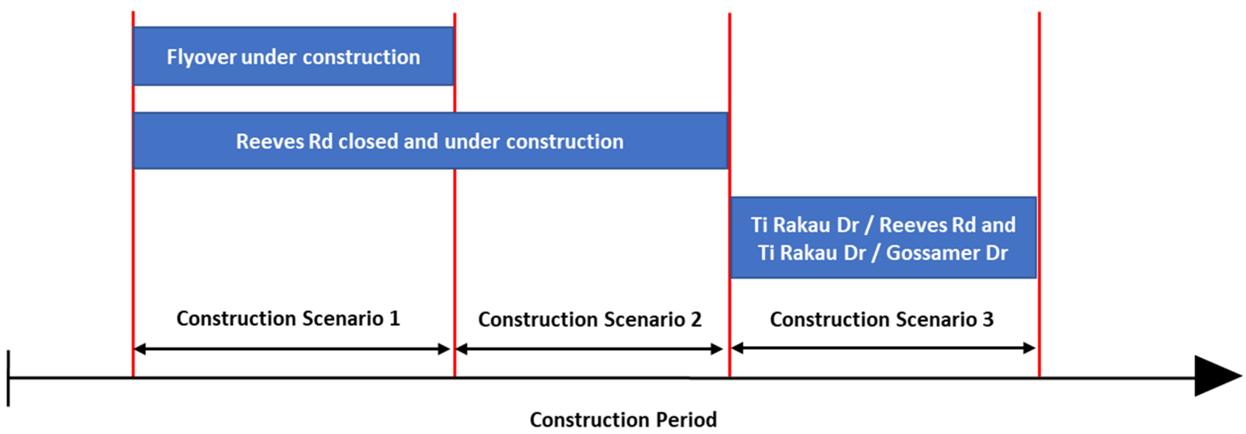



**Figure 68: Construction modelling scenarios**

Considering the construction programme, from a transport perspective, the closure of Reeves Road and the ongoing construction of the RRF is considered the first major change to the transport network in the EB2 and EB3R project areas. Construction Scenario 1 simulates these activities.

The next major change to the transport network is the completion of the RRF, while Reeves Road underneath the RRF remains closed. These changes are simulated in Construction Scenario 2.

The final major changes to the transport network are the construction of the Ti Rakau Drive / Reeves Road intersection (underneath the RRF) and the Ti Rakau Drive / Gossamer Drive intersection. These works will occur after Reeves Road and the RRF have been constructed and will occur during a low traffic period (December to January) to mitigate the effects of the disruption. These activities are simulated in Construction Scenario 3.

The sections below provide a description of each individual scenario, analysis of the scenario, followed by an assessment.

##### *5.2.2.2 Construction Scenario 1*

Construction Scenario 1 simulates the closure of Reeves Road and the construction of the RRF. Various other ongoing construction activities, with lesser expected effects, as well as sections of work already completed were also included under Construction Scenario 1. These include:

- Closure of William Roberts Road north between Pakuranga Road and Reeves Road. Removing the southern approach to the intersection with Pakuranga Road and the northern approach to the intersection with Reeves Road, see **Section 4.2.1.2**. This will in turn temporarily convert the Pakuranga Road / William Roberts Road intersection to a no stop intersection / free-flow conditions

- Ongoing Pakuranga Road / RRF tie-in works, consisting of reducing Pakuranga Road to five lanes. Three lanes will be provided for the critical direction of traffic flow during the AM and PM peak hours and two lanes for the opposite direction, see **Section 4.2.1.3**

- Ongoing construction of Phase 4 of the Ti Rakau Drive / William Roberts Road and Ti Rakau Drive / Mattson Road intersections. This phase of work is predicted to be the 'worst-case' during the construction of these intersections as it is anticipated to have the highest level of effect given the potential lane closures and associated traffic disruption, see **Section 4.2.2.1**

**Intersection Performance:**

The AM peak hour for intersections assessed in Construction Scenario 1 was between 08:00 – 09:00 and the PM peak hour was between 16:15 – 17:15. The horizon year for all intersection assessments was 2028. Traffic signal phasing diagrams per intersection are provided in **Appendix D** and lane performance summaries per intersection are provided in **Appendix E**.

Intersection performance analyses were undertaken at the following intersections under Construction Scenario 1:

- Pakuranga Road / Ti Rakau Drive
- Pakuranga Road / Brampton Court
- Reeves Road / Aylesbury Street
- William Roberts Road / Reeves Road
- William Roberts Road / Cortina Place
- Ti Rakau Drive / Aylesbury Street north
- Ti Rakau Drive / Aylesbury Street south

- Ti Rakau Drive / Reeves Road / SEART
- Ti Rakau Drive / William Roberts Road
- Ti Rakau Drive / Mattson Road
- Ti Rakau Drive / Edgewater Drive west
- Ti Rakau Drive / Gossamer Drive

**Table 21** provides a comparison of the intersection performance between the Do-Minimum and Construction Scenario 1 during the AM peak, with a 2028 horizon year.

**Table 21: Intersection performance – Do-Minimum vs Construction Scenario 1 (AM peak, 2028)**

| Intersection | Do-Minimum | | | Construction Scenario 1 | | |
|---|---|---|---|---|---|---|
| | **LOS** | **DOS (v/c)** | **Delay [s]** | **LOS** | **DOS (v/c)** | **Delay [s]** |
| Pakuranga Rd / Ti Rakau Dr | C | 0.85 | 33 | C | 0.90 | 33 |
| Pakuranga Rd / Brampton Ct | N/A | 0.42 | 1 | N/A | 0.39 | 1 |
| Reeves Rd / Aylesbury St | N/A | 0.27 | 1 | N/A | 0.03 | 3 |
| William Roberts Rd / Reeves Rd | N/A | 0.68 | 7 | N/A | 0.18 | 4 |
| William Roberts Rd / Cortina Pl | Built during WRRE | | | N/A | 0.26 | 1 |
| Ti Rakau Dr / Aylesbury St north | N/A | 1.49 | 6 | N/A | 1.67 | 5 |
| Ti Rakau Dr / Aylesbury St south | N/A | 0.26 | 1 | N/A | 0.29 | 1 |
| Ti Rakau Dr/ Reeves Rd / SEART | F | 0.90 | 178 | D | 1.00 | 49 |
| Ti Rakau Dr / William Roberts Rd | Built during WRRE | | | C | 0.88 | 26 |
| Ti Rakau Dr / Mattson Rd | B | 0.79 | 16 | A | 0.78 | 10 |
| Ti Rakau Dr / Edgewater Drive west | C | 0.87 | 27 | C | 0.85 | 27 |
| Ti Rakau Dr / Gossamer Dr | D | 1.02 | 48 | D | 0.89 | 35 |

SIDRA analysis indicates that in the AM peak, overall Construction Scenario 1 is expected to result in minimal adverse effects to intersection performance along the network. Compared to the Do-Minimum scenario, similar intersection performance is expected at the following intersections:

- Pakuranga Road / Ti Rakau Drive
- Pakuranga Road / Brampton Court
- Reeves Road / Aylesbury Street
- Ti Rakau Drive / Aylesbury Street north
- Ti Rakau Drive / Aylesbury Street south
- Ti Rakau Drive / Mattson Drive
- Ti Rakau Drive / Edgewater Drive west

Improvements in DOS and delay are predicted at the William Roberts Road / Reeves Road intersection and is expected to operate with spare capacity.

The new William Roberts Road / Cortina Place and Ti Rakau Drive / William Roberts Road intersections are expected to operate with spare capacity during the Reeves Road closure and construction of the RRF.

Although increases in DOS are predicted for the Ti Rakau Drive / Aylesbury Street north intersection, in practical terms, the intersection is at capacity in the Do-Minimum scenario and so the effects of Construction Scenario 1 are considered to be negligible.

Improvements in DOS and delay are predicted at the Ti Rakau Drive / Reeves Road / SEART and Ti Rakau Drive / Gossamer Drive intersections and are expected to operate with spare capacity (both LOS D).

**Table 22** provides a comparison of the intersection performance between the Do-Minimum and Construction Scenario 1 during the PM peak, with a 2028 horizon year.

**Table 22: Intersection performance – Do-Minimum vs Construction Scenario 1 (PM Peak, 2028)**

| Intersection | Do-Minimum | | | Construction Scenario 1 | | |
|---|---|---|---|---|---|---|
| | **LOS** | **DOS (v/c)** | **Delay [s]** | **LOS** | **DOS (v/c)** | **Delay [s]** |
| Pakuranga Rd / Ti Rakau Dr | D | 0.91 | 47 | C | 0.88 | 32 |
| Pakuranga Rd / Brampton Ct | N/A | 0.53 | 1 | N/A | 0.42 | 1 |
| Reeves Rd / Aylesbury St | N/A | 0.38 | 1 | N/A | 0.04 | 2 |
| William Roberts Rd / Reeves Rd | N/A | 0.87 | 11 | N/A | 0.22 | 4 |
| William Roberts Rd / Cortina Pl | Built during WRRE | | | N/A | 0.21 | 1 |
| Ti Rakau Dr / Aylesbury St north | N/A | 4.67 | 36 | N/A | 2.91 | 18 |
| Ti Rakau Dr / Aylesbury St south | N/A | 0.38 | 1 | N/A | 0.29 | 1 |
| Ti Rakau Dr/ Reeves Rd / SEART | F | 1.13 | 83 | B | 0.81 | 19 |
| Ti Rakau Dr / William Roberts Rd | Built during WRRE | | | B | 0.88 | 20 |
| Ti Rakau Dr / Mattson Rd | B | 0.66 | 12 | D | 0.90 | 36 |
| Ti Rakau Dr / Edgewater Drive west | C | 0.85 | 26 | C | 0.89 | 32 |
| Ti Rakau Dr / Gossamer Dr | D | 0.90 | 44 | D | 0.87 | 38 |

SIDRA analysis indicates that in the PM peak, Construction Scenario 1 is also expected to result in minimal adverse effects to intersection performance along the network overall. Compared to the Do-Minimum scenario, similar intersection performance is expected at the following intersections:

- Pakuranga Road / Ti Rakau Drive
- Pakuranga Road / Brampton Court
- Reeves Road / Aylesbury Street
- Ti Rakau Drive / Aylesbury Street north
- Ti Rakau Drive / Aylesbury Street south
- Ti Rakau Drive / Edgewater Drive west
- Ti Rakau Drive / Gossamer Drive

Improvements in DOS and delay are predicted at the William Roberts Road / Reeves Road intersection and it is expected to operate with spare capacity.

During the closure of Reeves Road, the new William Roberts Road / Cortina Place and Ti Rakau Drive / William Roberts Road intersections are expected to operate with spare capacity during the PM peak.

Similar to the AM peak, the Ti Rakau Drive / Aylesbury Street north intersection is expected to perform poorly during the PM peak. However, the intersection is at capacity in the Do-Minimum scenario and so the effects of Construction Scenario 1 are considered to be negligible.

Significant improvements in DOS and delay are predicted at the Ti Rakau Drive / Reeves Road / SEART intersection and is expected to operate with spare capacity (LOS B).

An increase in DOS and delay is predicted at the Ti Rakau Drive / Mattson Road intersection during the PM peak, however the intersection is expected to operate at an acceptable LOS D.

#### 5.2.2.3 Construction Scenario 2

Construction Scenario 2 simulates the completion of the RRF, while Reeves Road underneath remains closed. Various other ongoing construction activities, with lesser expected effects, as well as sections of work already completed were also included under Construction Scenario 2. These include:

- Completion of the William Roberts Road north closure works, see **Section 4.2.1.2**
- Completion of the Pakuranga Road / RRF tie-in works, see **Section 4.2.1.3**
- Completion of the SEART off-ramp and on-ramp works, during which the off-ramp left-turn lanes will be reduced to one lane, see **Section 4.2.1.4**
- Completion of the new bus lanes on Ti Rakau Drive between Pakuranga Road and Reeves Road as well as the crossroads intersection with Palm Avenue and Aylesbury Street. Ongoing construction of the new eastbound lanes in this section of Ti Rakau Drive, see **Section 4.2.1.5**
- The western approach to the Ti Rakau Drive / Reeves Road intersection will provide two through lanes only (no right-turn onto SEART). The eastern approach will provide two left-turn lanes onto SEART and two through lanes. The off-ramp will provide one left-turn lane and two right-turn lanes, see **Section 4.2.1.5**
- Completion of the Pakuranga Road works between Ti Rakau Drive and the RRF, see **Section 4.2.1.6**
- Completion of the Ti Rakau Drive / William Roberts Road and Ti Rakau Drive / Mattson Road intersection works, see **Section 4.2.2.1**
- Completion of Phases 1 and 2 of the Ti Rakau Drive works between Mattson Road and Gossamer Drive, see **Section 4.2.2.3** and **Section 4.2.2.4**

**Intersection Performance:**

The AM peak hour for intersections assessed in Construction Scenario 2 was between 07:45 – 08:45 and the PM peak hour was between 16:15 – 17:15. The horizon year for all intersection assessments was 2028. Traffic signal phasing diagrams per intersection are provided in **Appendix F** and lane performance summaries per intersection are provided in **Appendix G**.

Intersection performance analyses were undertaken at the following intersections under Construction Scenario 2:

- Pakuranga Road / Ti Rakau Drive
- Pakuranga Road / Brampton Court
- Pakuranga Road / RRF
- Reeves Road / Aylesbury Street
- William Roberts Road / Reeves Road
- William Roberts Road / Cortina Place
- Ti Rakau Drive / Aylesbury Street / Palm Avenue

- Ti Rakau Drive / Reeves Road / SEART
- Ti Rakau Drive / William Roberts Road
- Ti Rakau Drive / Mattson Road
- Ti Rakau Drive western U-turn facility
- Ti Rakau Drive eastern U-turn facility
- Ti Rakau Drive / Gossamer Drive

**Table 23** provides a comparison of the intersection performance between the Do-Minimum and Construction Scenario 2 during the AM peak, with a 2028 horizon year.

**Table 23: Intersection performance – Do-Minimum vs Construction Scenario 2 (AM peak, 2028)**

| Intersection | Do-Minimum | | | Construction Scenario 2 | | |
|---|---|---|---|---|---|---|
| | **LOS** | **DOS (v/c)** | **Delay [s]** | **LOS** | **DOS (v/c)** | **Delay [s]** |
| Pakuranga Rd / Ti Rakau Dr | C | 0.85 | 33 | D | 0.84 | 46 |
| Pakuranga Rd / Brampton Ct | N/A | 0.42 | 1 | N/A | 0.37 | 1 |
| Pakuranga Rd / RRF | Built during EB2 | | | D | 0.92 | 41 |
| Reeves Rd / Aylesbury St | N/A | 0.27 | 1 | N/A | 0.03 | 3 |
| William Roberts Rd / Reeves Rd | N/A | 0.68 | 7 | N/A | 0.16 | 5 |
| William Roberts Rd / Cortina Pl | Built during WRRE | | | N/A | 0.15 | 1 |
| Ti Rakau Dr / Aylesbury St / Palm Ave | Built during EB2 | | | C | 0.78 | 33 |
| Ti Rakau Dr/ Reeves Rd / SEART | F | 0.90 | 178 | C | 0.86 | 22 |
| Ti Rakau Dr / William Roberts Rd | Built during WRRE | | | B | 0.86 | 14 |
| Ti Rakau Dr / Mattson Rd | B | 0.79 | 16 | C | 0.88 | 25 |
| Ti Rakau Dr western U-turn facility | Built during EB3R | | | A | 0.69 | 4 |
| Ti Rakau Dr eastern U-turn facility | Built during EB3R | | | A | 0.83 | 10 |
| Ti Rakau Dr / Gossamer Dr | D | 1.02 | 48 | E | 0.94 | 63 |

SIDRA analysis indicates that overall, in the AM peak, Construction Scenario 2 is expected to result in minimal adverse effects to intersection performance along the network. Compared to the Do-Minimum scenario, similar intersection performance is expected at the following intersections:

- Pakuranga Road / Brampton Court
- Reeves Road / Aylesbury Street
- William Roberts Road / Reeves Road

Once constructed, the following new intersections are expected to operate with spare capacity during the AM peak under Construction Scenario 2, all with acceptable LOS and DOS:

- Pakuranga Road / RRF
- William Roberts Road / Cortina Place
- Ti Rakau Drive / Aylesbury Street / Palm Avenue
- Ti Rakau Drive / William Roberts Road
- Ti Rakau Drive western U-turn facility
- Ti Rakau Drive eastern U-turn facility

Increases in delay are expected at the Pakuranga Road / Ti Rakau Drive intersection during the AM peak hour, however the intersection is expected to operate at an acceptable LOS D.

Significant improvements in DOS and delay are predicted at the Ti Rakau Drive / Reeves Road / SEART intersection, and is expected to operate with spare capacity (LOS C).

Similar to Construction Scenario 1, a minor increase in DOS and delay is predicted at the Ti Rakau Drive / Mattson Road intersection during the AM peak under Construction Scenario 2. However, the intersection is expected to operate at an acceptable LOS C.

A minor increase in delay is predicted at the Ti Rakau Drive / Gossamer Drive intersection, from 48s to 63s under Construction Scenario 2. Regardless, the intersection is expected to operate with spare capacity (LOS E).

**Table 24** provides a comparison of the intersection performance between the Do-Minimum and Construction Scenario 2 during the PM peak, with a 2028 horizon year.

**Table 24: Intersection performance – Do-Minimum vs Construction Scenario 2 (PM Peak, 2028)**

| Intersection | Do-Minimum | | | Construction Scenario 2 | | |
|---|---|---|---|---|---|---|
| | **LOS** | **DOS (v/c)** | **Delay [s]** | **LOS** | **DOS (v/c)** | **Delay [s]** |
| Pakuranga Rd / Ti Rakau Dr | D | 0.91 | 47 | E | 1.52 | 72 |
| Pakuranga Rd / Brampton Ct | N/A | 0.53 | 1 | N/A | 0.38 | 1 |
| Pakuranga Rd / RRF | Built during EB2 | | | E | 1.02 | 65 |
| Reeves Rd / Aylesbury St | N/A | 0.38 | 1 | N/A | 0.08 | 3 |
| William Roberts Rd / Reeves Rd | N/A | 0.87 | 11 | N/A | 0.20 | 3 |
| William Roberts Rd / Cortina Pl | Built during WRRE | | | N/A | 0.33 | 6 |
| Ti Rakau Dr / Aylesbury St / Palm Ave | Built during EB2 | | | D | 0.85 | 41 |
| Ti Rakau Dr/ Reeves Rd / SEART | F | 1.13 | 83 | C | 0.89 | 31 |
| Ti Rakau Dr / William Roberts Rd | Built during WRRE | | | B | 0.77 | 10 |
| Ti Rakau Dr / Mattson Rd | B | 0.66 | 12 | B | 0.81 | 13 |
| Ti Rakau Dr western U-turn facility | Built during EB3R | | | A | 0.67 | 4 |
| Ti Rakau Dr eastern U-turn facility | Built during EB3R | | | A | 0.81 | 9 |
| Ti Rakau Dr / Gossamer Dr | D | 0.90 | 44 | E | 1.02 | 73 |

SIDRA analysis indicates that in the PM peak, Construction Scenario 2 is also expected to result in minimal adverse effects to intersection performance along the network overall. Compared to the Do-Minimum scenario, similar intersection performance is expected at the following intersections:

- Pakuranga Road / Brampton Court
- Reeves Road/ Aylesbury Street
- Ti Rakau Drive / Mattson Road

Once constructed, the following new intersections are expected to operate with spare capacity during the PM peak under Construction Scenario 2, all with acceptable LOS and DOS:

- Pakuranga Road / RRF
- William Roberts Road / Cortina Place
- Ti Rakau Drive / Aylesbury Street / Palm Avenue
- Ti Rakau Drive / William Roberts Road
- Ti Rakau Drive western U-turn facility

- Ti Rakau Drive eastern U-turn facility

Increases in DOS and delay are predicted at the Pakuranga Road / Ti Rakau Drive intersection, and is predicted to operate near capacity in the PM peak under Construction Scenario 2. However, the LOS E is considered acceptable.

Improvements in DOS and delay are predicted at the William Roberts Road / Reeves Road intersection during the PM peak hour under Construction Scenario 2.

Significant improvements in DOS and delay are predicted at the Ti Rakau Drive / Reeves Road / SEART intersection, and it is expected to operate with spare capacity (LOS C).

An increase in DOS and delay is predicted at the Ti Rakau Drive / Gossamer Drive intersection under Construction Scenario 2. Regardless, the intersection is expected to operate at an acceptable LOS E.

### *5.2.2.4 Construction Scenario 3*

The final major changes to the transport network are the construction of the Ti Rakau Drive / Reeves Road intersection (underneath the RRF) and the Ti Rakau Drive / Gossamer Drive intersection. These works will occur after Reeves Road and the RRF have been constructed and will occur during a low traffic period (December to January) to mitigate the effects of the disruption. These activities are simulated in Construction Scenario 3.

**Proposed Intersection Layout during Construction – Ti Rakau Drive / Reeves Road:**

The intersection will be built in two sub-phases with Ti Rakau Drive being reduced to one lane each way for a short period (approximately one month). Additionally, the right-turn movements from Ti Rakau Drive onto SEART will be closed and detoured via Pakuranga Road and the new RRF. The right-turn movements from SEART will also be closed and will be detoured via the RRF and Pakuranga Road. The left-turn movements from Ti Rakau Drive onto SEART will be reduced to one lane. **Figure 69** shows the proposed temporary layout of the intersection during the works, with the work zone in dark green.

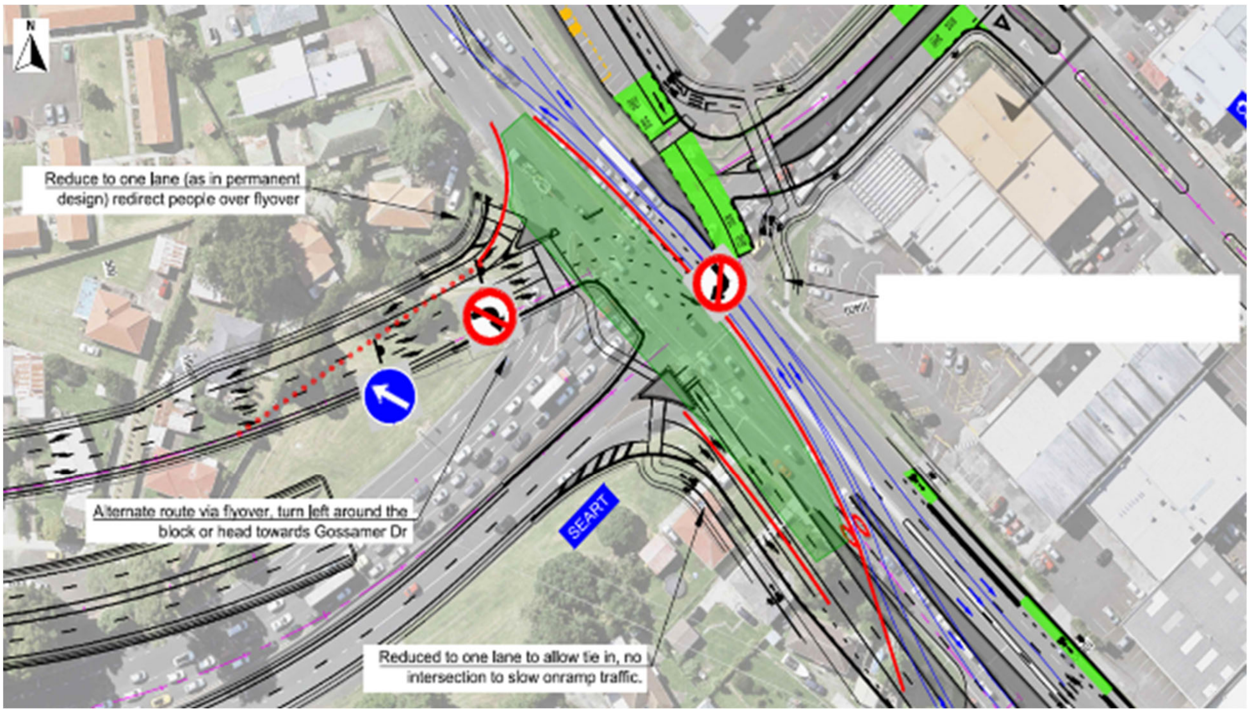



**Figure 69: Ti Rakau Dr / Reeves Rd proposed layout during construction**

**Proposed Intersection Layout during Construction – Ti Rakau Drive / Gossamer Drive:**

The preferred construction method, without altering the pavement type or compromising on pavement quality, is a 'Blitz' approach. In other words, a relatively short period of time with a higher intensity of works. This approach will consist of temporarily closing access to Gossamer Drive, to enable the majority of the difficult to access areas to be completed. Furthermore, Ti Rakau Drive will be reduced to one lane each way through the intersection. The Freemantle Place approach will remain as per the existing environment and will be completed in the subsequent sub-phases (Phases 3b-c, see **Section 4.2.2.5**). However, this approach has large programming risks and the effects on the traffic environment are dependent on the quality of communication with the public leading up to the closure.

**Traffic Volume Reduction during Holiday Period:**

Throughout this ITA, traffic volumes used in the modelling assessments represent an average weekday's traffic demand. However, in order to model a low traffic period, such as a December to January holiday period, historical traffic data (SCATS) was analysed at various intersections. By comparing traffic data from an average weekday with that of a December holiday period, a suitable reduction factor was determined. This reduction factor was used in the modelling assessments to produce representative traffic volumes.

**Figure 70** provides a comparison of typical weekday traffic volumes and December holiday period traffic volumes at the Ti Rakau Drive / Reeves Road / SEART intersection. On average, the intersection experiences a 24% reduction in peak period traffic volumes across all approaches.

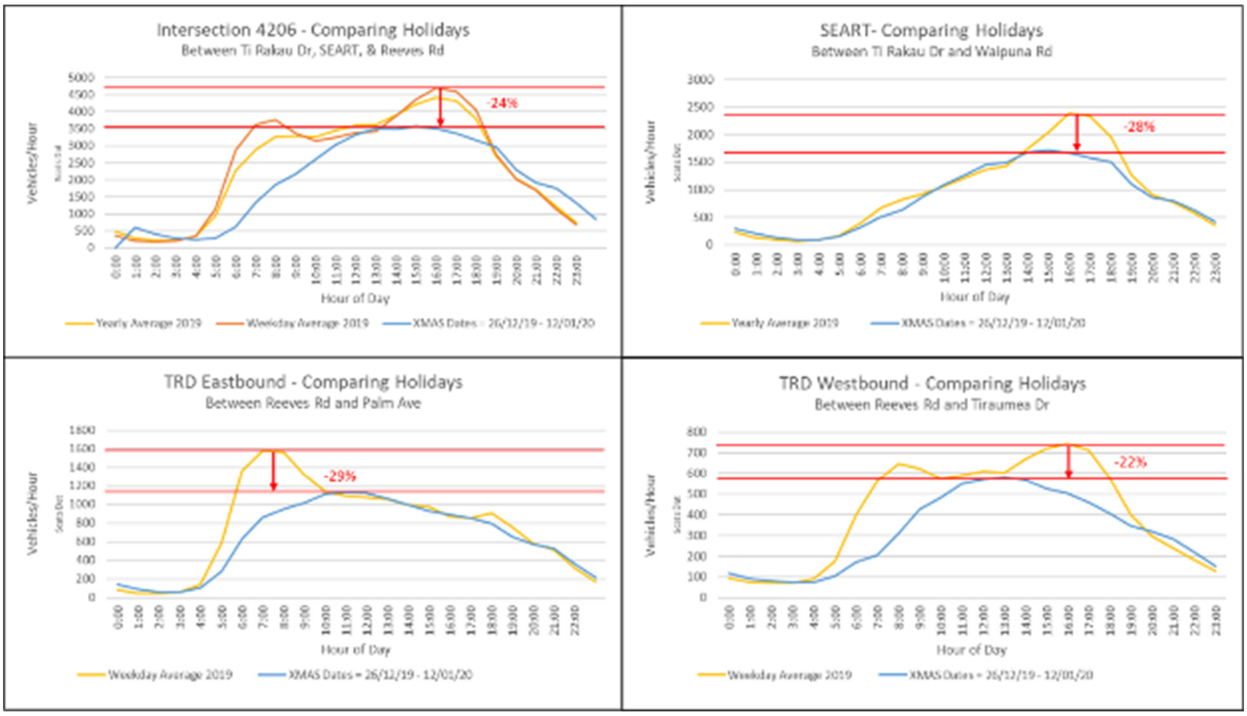



**Figure 70: Ti Rakau Dr / Reeves Rd intersection traffic volume reduction**[27]

**Figure 71** below provides a comparison of typical weekday traffic volumes and December holiday period traffic volumes at Gossamer Drive. On average, Gossamer Drive experiences a 50% reduction in peak period traffic volumes.

[27] Traffic data sourced from 2019 SCATS data for site 4206.

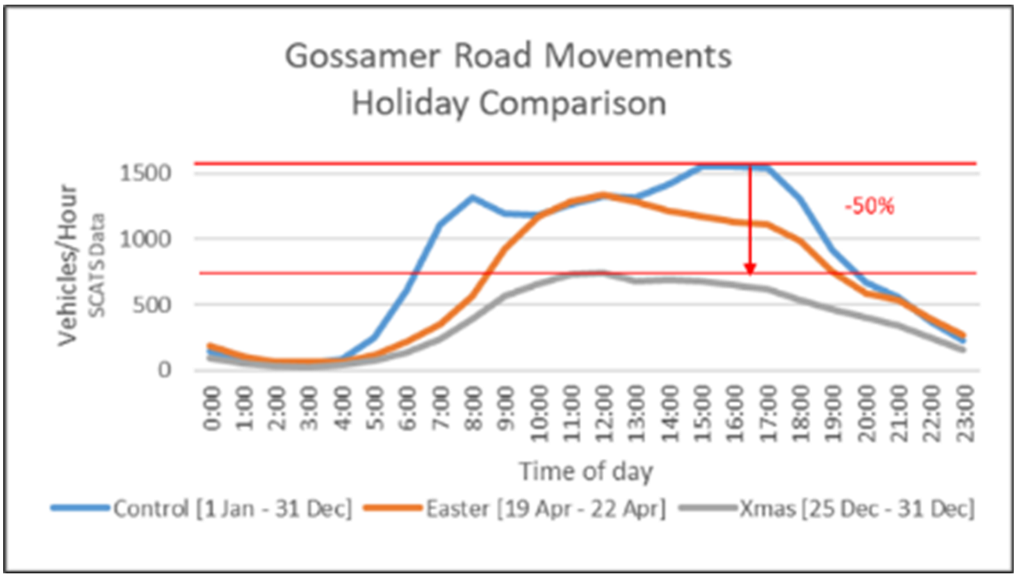



**Figure 71: Gossamer Dr traffic volume reduction**[28]

It is expected that this behaviour will continue in the future, during the planned construction of the intersections. Furthermore, the graphs show that even greater reductions in traffic volumes could be expected during the AM and PM peak periods.

Extensive community engagement will be undertaken well in advance of the planned works at the Ti Rakau Drive / Reeves Road and Ti Rakau Drive / Gossamer Drive intersections. This will include notices of the planned works, dates of construction, messaging to avoid the areas where disruption is anticipated and alternative routes. This will be achieved through the CTMP. With these mitigation measures, it is anticipated that a 40% reduction in background traffic volumes could be achieved during the planned construction of the intersection.

**Intersection Performance:**

The AM peak hour for intersections assessed in Construction Scenario 3 was between 07:15 – 08:15 and the PM peak hour was between 16:15 – 17:15. The horizon year for all intersection assessments was 2028. A 40% reduction in background traffic volumes was applied for the reasons discussed above. Traffic signal phasing diagrams per intersection are provided in **Appendix H** and lane performance summaries per intersection are provided in **Appendix I**.

[28] Traffic data sourced from 2019 SCATS data for site 4213.

Intersection performance analyses were undertaken at the following intersections:

- Pakuranga Road / Ti Rakau Drive
- Pakuranga Road / Brampton Court
- Pakuranga Road / RRF
- William Roberts Road / Cortina Place
- Ti Rakau Drive / Aylesbury Street / Palm Avenue
- Ti Rakau Drive / Reeves Road / SEART
- Ti Rakau Drive / William Roberts Road
- Ti Rakau Drive / Mattson Road
- Ti Rakau Drive western U-turn facility
- Ti Rakau Drive eastern U-turn facility
- Ti Rakau Drive / Gossamer Drive

**Table 25** below provides a comparison of the intersection performance between the Do-Minimum and Construction Scenario 3 during the AM peak, with a 2028 horizon year.

**Table 25: Intersection performance – Do-Minimum vs Construction Scenario 3 (AM peak, 2028)**

| Intersection | Do-Minimum | | | Construction Scenario 3 | | |
|---|---|---|---|---|---|---|
| | **LOS** | **DOS (v/c)** | **Delay [s]** | **LOS** | **DOS (v/c)** | **Delay [s]** |
| Pakuranga Rd / Ti Rakau Dr | C | 0.85 | 33 | D | 0.83 | 38 |
| Pakuranga Rd / Brampton Ct | N/A | 0.42 | 1 | N/A | 0.33 | 1 |
| Pakuranga Rd / RRF | Built during EB2 | | | C | 0.89 | 30 |
| William Roberts Rd / Cortina Pl | Built during WRRE | | | N/A | 0.07 | 1 |
| Ti Rakau Dr / Aylesbury St / Palm Ave | Built during EB2 | | | C | 0.89 | 29 |
| Ti Rakau Dr/ Reeves Rd / SEART | F | 0.90 | 178 | B | 0.89 | 17 |
| Ti Rakau Dr / William Roberts Rd | Built during WRRE | | | B | 0.55 | 10 |
| Ti Rakau Dr / Mattson Rd | B | 0.79 | 16 | B | 0.77 | 16 |
| Ti Rakau Dr western U-turn facility | Built during EB3R | | | A | 0.43 | 4 |
| Ti Rakau Dr eastern U-turn facility | Built during EB3R | | | A | 0.79 | 7 |
| Ti Rakau Dr / Gossamer Dr | D | 1.02 | 48 | C | 0.95 | 31 |

SIDRA analysis indicates that overall, in the AM peak, Construction Scenario 3 is expected to result in minimal adverse effects to intersection performance along the network. Compared to the Do-Minimum scenario, similar intersection performance is expected at the following intersections:

- Pakuranga Road / Ti Rakau Drive
- Pakuranga Road / Brampton Court
- Ti Rakau Drive / Mattson Road

Once constructed, the following new intersections are expected to operate with spare capacity during the AM peak under Construction Scenario 3, all with acceptable LOS and DOS:

- Pakuranga Road / RRF
- William Roberts Road / Cortina Place
- Ti Rakau Drive / Aylesbury Street / Palm Avenue
- Ti Rakau Drive / William Roberts Road
- Ti Rakau Drive western U-turn facility
- Ti Rakau Drive eastern U-turn facility

Under a 40% reduction in traffic volumes and the various lane closures at the Ti Rakau Drive / Reeves Road / SEART intersection during its construction, the intersection is predicted to operate at an acceptable LOS B with a DOS of 0.89 and delay of 17s.

Minor improvements in DOS and delay are predicted at the Ti Rakau Drive / Gossamer Drive intersection and is expected to operate with spare capacity (LOS C).

**Table 26** below provides a comparison of the intersection performance between the Do-Minimum and Construction Scenario 3 during the PM peak, with a 2028 horizon year.

**Table 26: Intersection performance – Do-Minimum vs Construction Scenario 3 (PM Peak, 2028)**

| Intersection | Do-Minimum | | | Construction Scenario 3 | | |
|---|---|---|---|---|---|---|
| | **LOS** | **DOS (v/c)** | **Delay [s]** | **LOS** | **DOS (v/c)** | **Delay [s]** |
| Pakuranga Rd / Ti Rakau Dr | D | 0.91 | 47 | D | 0.87 | 39 |
| Pakuranga Rd / Brampton Ct | N/A | 0.53 | 1 | N/A | 0.29 | 1 |
| Pakuranga Rd / RRF | Built during EB2 | | | E | 0.98 | 62 |
| William Roberts Rd / Cortina Pl | Built during WRRE | | | N/A | 0.12 | 1 |
| Ti Rakau Dr / Aylesbury St / Palm Ave | Built during EB2 | | | D | 0.87 | 41 |
| Ti Rakau Dr/ Reeves Rd / SEART | F | 1.13 | 83 | B | 0.84 | 12 |
| Ti Rakau Dr / William Roberts Rd | Built during WRRE | | | B | 0.58 | 15 |
| Ti Rakau Dr / Mattson Rd | B | 0.66 | 12 | B | 0.81 | 17 |
| Ti Rakau Dr western U-turn facility | Built during EB3R | | | A | 0.64 | 5 |
| Ti Rakau Dr eastern U-turn facility | Built during EB3R | | | A | 0.77 | 7 |
| Ti Rakau Dr / Gossamer Dr | D | 0.90 | 44 | D | 0.97 | 49 |

SIDRA analysis indicates that in the PM peak, Construction Scenario 3 is also expected to result in minimal adverse effects to intersection performance along the network overall. Compared to the Do-Minimum scenario, similar intersection performance is expected at the following intersections:

- Pakuranga Road / Ti Rakau Drive
- Pakuranga Road / Brampton Court
- Ti Rakau Drive / Mattson Road
- Ti Rakau Drive / Gossamer Drive

Once constructed, the following new intersections are expected to operate with spare capacity during the PM peak under Construction Scenario 3, all with acceptable LOS and DOS and low delays:

- Pakuranga Road / RRF
- William Roberts Road / Cortina Place
- Ti Rakau Drive / Aylesbury Street / Palm Avenue
- Ti Rakau Drive / William Roberts Road
- Ti Rakau Drive western U-turn facility
- Ti Rakau Drive eastern U-turn facility

Similar to the AM peak, under a 40% reduction in traffic volumes and the various lane closure at the Ti Rakau Drive / Reeves Road / SEART intersection, it is predicted to operate at an acceptable LOS B with a DOS of 0.84 and delay of 12s.

#### 5.2.2.5 EB2 – Pakuranga Road / William Roberts Road Temporary Signalisation

As stated in **Section 5.1.1.4**, the Pakuranga Road / William Roberts Road intersection will be signalised temporarily to aid construction traffic turning into and out from William Roberts Road. The signalisation will improve the capacity of the right-turn movements and improve safety of turning across three lanes of through traffic.

It is anticipated that the temporary signalisation of the Pakuranga Road / William Roberts Road intersection will occur once the William Roberts Road extension is completed, and construction commences on EB2 and EB3R. This change in the transport network could not be modelled as part of Construction Scenario 1, as William Roberts Road is already closed during this scenario. Therefore, a separate assessment is provided here.

**Table 27** provides an intersection performance summary of the temporary signalisation of the Pakuranga Road / William Roberts Road intersection.

**Table 27: Pakuranga Rd / William Roberts Rd temporary signalisation performance summary**[29]

| Scenario | Level-of-Service (LOS) | | Degree of Saturation (DOS) | | Average Delay [sec] | |
|---|---|---|---|---|---|---|
| | AM | PM | AM | PM | AM | PM |
| Do-Minimum (Unsignalised) | N/A | N/A | 9.43 | 32.92 | 386 | 2,129 |
| EB2 and EB3R (Signalised + construction traffic) | C | C | 0.92 | 0.86 | 35 | 25 |

SIDRA analysis indicates the temporary signalisation of the Pakuranga Road / William Roberts Road intersection is expected to result in a significant improvement in intersection performance during both peak hours.

The average DOS for the intersection is predicted to decrease to <1.0 during both peak hours. The average delay is also predicted to experience a significant improvement, compared to the Do-Minimum, during both peak hours.

Once the RRF northern abutment is constructed and the construction yard layout has reduced, construction traffic volumes will reduce, and the temporary signalisation will be removed.

[29] SIDRA analyses carried out with traffic volumes based on a 2028 horizon year.

#### 5.2.2.6 EB2 – Pakuranga Road Drainage Works

As stated in **Section 4.2.1.6**, the initial stages of the Pakuranga Road construction will also include longitudinal and crossing drainage works. This phase of work will follow after the Reeves Road and RRF construction, as well as the works on the northern side of Ti Rakau Drive between Pakuranga Road and Reeves Road. **Figure 72** shows an indicative location of the planned drainage works.

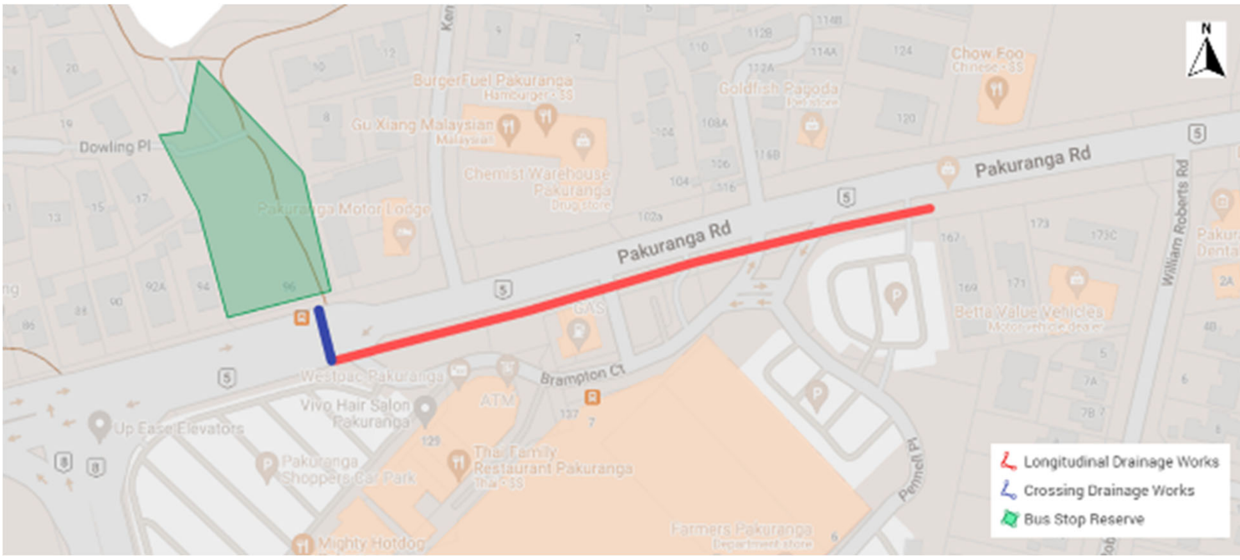



**Figure 72: Pakuranga Rd drainage works**

**Longitudinal Drainage Works:**

Longitudinal drainage construction will consist of the temporary closure of a section of the westbound kerbside lane on Pakuranga Road between William Roberts Road and Ti Rakau Drive. The works are anticipated to have a duration of approximately one month.

Pakuranga Road westbound traffic volumes at this location are predicted to be roughly 900 veh/h in the AM peak and 950 veh/h in the PM peak. As such, the remaining two through lanes are expected to have sufficient spare capacity and the effects on general traffic are considered to be negligible.

An assessment of effects on property access associated with these works is provided in **Section 5.5.4.1**.

**Crossing Drainage Works:**

Crossing drainage works are planned on Pakuranga Road near the signalised pedestrian crossing, in the vicinity of the Bus Stop Reserve. The works will consist of temporarily reducing the Pakuranga Road carriageway to three lanes as the large trenching work is completed and is anticipated to have a duration of approximately two weeks.

The centre lane will act tidally, providing two lanes for the critical direction of flow in the AM and PM peaks and one lane for the opposite direction. This will be enabled by a dynamic flow arrangement. **Table 28** provides intersection performance summaries of the Ti Rakau Drive / Pakuranga Road intersection and the signalised pedestrian crossing during the crossing drainage works.

**Table 28: Pakuranga Rd performance summary[30]**

| Scenario | Level-of-Service (LOS) | | Degree of Saturation (DOS) | | Average Delay [sec] | |
|---|---|---|---|---|---|---|
| | AM | PM | AM | PM | AM | PM |
| **Ti Rakau Dr / Pakuranga Rd** | | | | | | |
| Do-Minimum (All lanes open) | C | D | 0.85 | 0.91 | 33 | 47 |
| EB2 and EB3R (Downstream lanes reduced) | E | E | 1.07 | 1.52 | 68 | 72 |
| **Pakuranga Rd signalised pedestrian crossing** | | | | | | |
| Do-Minimum (All lanes open) | E | B | 1.02 | 0.85 | 67 | 10 |
| EB2 and EB3R (Lanes reduced) | B | E | 0.87 | 1.04 | 16 | 64 |

Although the Pakuranga Road signalised pedestrian crossing is expected to experience poorer performance during the PM peak, acceptable LOS, DOS and delays are predicted at this crossing during both the AM and PM peaks hours.

However, the decrease in roadway capacity on Pakuranga Road near the crossing is predicted to result in large queues extending upstream through the Ti Rakau Drive / Pakuranga Road intersection during the PM peak. As such, a decrease in intersection performance is predicted at the Pakuranga Road / Ti Rakau Drive intersection during the PM peak hour.

The temporary effects to general traffic on Pakuranga Road will be mitigated by temporarily disabling the signalised pedestrian crossing. This will allow vehicles to travel through the work zone, without stopping (subject to downstream congestion), and queues on Pakuranga Road are expected to be manageable.

Temporarily disabling the signalised pedestrian crossing will result in an increase of approximately 140 m in travel distance for pedestrians to the nearest crossing at the Ti Rakau Drive / Pakuranga Road intersection. Given the short duration of disruption and the short increase in travel distance, the temporary effects to pedestrians are expected to be negligible.

[30] SIDRA analyses carried out with traffic volumes based on a 2028 horizon year.

#### 5.2.2.7 EB3R – Ti Rakau Drive / Edgewater Drive East Temporary Signalisation

As stated in **Section 4.2.2.3**, Edgewater Drive is a loop with two accesses to Ti Rakau Drive. In the existing environment, Edgewater Drive west is a signalised intersection, while Edgewater Drive east is a priority-controlled intersection.

During Phase 1 of Ti Rakau Drive (Mattson Road to Gossamer Drive) in EB3R, traffic will be detoured to one end of the loop enabling the other end to be closed and rebuilt. As such, a temporary traffic signal will be provided at the Edgewater east intersection while the western intersection is under construction. It is anticipated that the construction of each intersection will have a duration of approximately two weeks.

**Table 29** provides intersection performance summaries of the Ti Rakau Drive / Edgewater Drive east and west intersections during Phase 1 of the EB3R.

**Table 29: Ti Rakau Dr / Edgewater Dr east and west performance summary[31]**

| Scenario | Level-of-Service (LOS) | | Degree of Saturation (DOS) | | Average Delay [sec] | |
|---|---|---|---|---|---|---|
| | AM | PM | AM | PM | AM | PM |
| **Edgewater Drive east** | | | | | | |
| Do-Minimum (Unsignalised) | N/A | N/A | 3.86 | 3.41 | 37 | 27 |
| EB2 and EB3R (Signalised + detoured traffic from Edgewater Dr west) | B | B | 0.78 | 0.75 | 15 | 14 |
| **Edgewater Drive west** | | | | | | |
| Do-Minimum | C | C | 0.87 | 0.85 | 27 | 26 |
| EB2 and EB3R (Detoured traffic from Edgewater Dr east) | C | C | 0.88 | 0.85 | 29 | 26 |

The temporary signalisation of Edgewater Drive east is predicted to result in improved intersection performance, with lower DOS and delays during both the AM and PM peak hours. The temporary signalisation will also improve the safety of vehicles turning right into and out from Edgewater Drive.

The increase in traffic volumes at the Edgewater Drive west intersection, during construction of the eastern intersection, are expected to lead to negligible increases in DOS and delay during both peak hours. Therefore, the effects to general traffic are considered to be negligible.

[31] SIDRA analyses carried out with traffic volumes based on a 2028 horizon year.

### 5.2.3 General Traffic Travel Times

Route travel times were determined using the AIMSUN model, with a 2028 horizon year. Similar to the assessment of travel times in the existing environment (see **Section 3.4.2**) and to maintain consistency across the different assessments already conducted as well as future ITAs, 4 routes were selected to compare route travel times between the Do-minimum and EB2/EB3R scenarios for general traffic. These routes are outlined below:

- Botany to Pakuranga (Ti Rakau Drive / Chapel Road intersection to Pakuranga Road / Williams Avenue intersection) – both directions
- Botany to SEART (Ti Rakau Drive / Te Irirangi Drive intersection to the western abutment on Waipuna Bridge) – both directions
- Howick to Pakuranga (Pakuranga Road / Glenmore Road intersection to Pakuranga Road / Williams Avenue intersection) – both directions
- Howick to SEART (Pakuranga Road / Glenmore Road intersection to the western abutment on Waipuna Bridge) – both directions

The sections below assess the temporary effects to travel times during the construction scenarios.

#### *5.2.3.1 Construction Scenario 1*

**Table 30** provides a comparison of the route travel times between the Do-Minimum and Construction Scenario 1, with a 2028 horizon year.

**Table 30: General traffic travel times – Do-Minimum vs Construction Scenario 1 (2028)**

| AM Peak | | | | | | |
|---|---|---|---|---|---|---|
| Route | Westbound | | | Eastbound | | |
| | Do Minimum [min] | Construction 1 [min] | Difference [min] | Do Minimum [min] | Construction 1 [min] | Difference [min] |
| Botany - Pakuranga | 24.7 | 42.2 | 17.5 | 13.9 | 18.2 | 4.3 |
| Botany - SEART | 20.9 | 39.9 | 19.0 | 13.7 | 13.7 | 0.0 |
| Howick - Pakuranga | 5.3 | 4.0 | -1.3 | 4.7 | 3.9 | -0.8 |
| Howick - SEART | 11.6 | 21.1 | 9.5 | 8.0 | 5.9 | -2.1 |
| **PM Peak** | | | | | | |
| Route | Westbound | | | Eastbound | | |
| | Do Minimum [min] | Construction 1 [min] | Difference [min] | Do Minimum [min] | Construction 1 [min] | Difference [min] |
| Botany - Pakuranga | 18.4 | 14.1 | -3.4 | 24.6 | 23.7 | -0.9 |
| Botany - SEART | 11.6 | 11.5 | -0.1 | 24.5 | 28.1 | 3.6 |
| Howick - Pakuranga | 4.7 | 3.3 | -1.4 | 3.4 | 3.3 | -0.1 |
| Howick - SEART | 5.0 | 4.5 | -0.5 | 7.5 | 12.0 | 4.5 |

Travels times from Botany towards SEART and Pakuranga (westbound) as well as from Howick to SEART (westbound) are predicted to experience relatively large increases during the AM peak period compared to the Do-Minimum. This is not unexpected given the following factors:

- The addition of the new Ti Rakau Drive / William Roberts Road intersection to the network
- The closure of Reeves Road and William Roberts Road north, whereby more vehicles are likely to divert to Ti Rakau Drive
- Ongoing construction of the Pakuranga Road / RRF tie-in
- Ongoing construction of the staggered-T arrangement of the Ti Rakau Drive / William Roberts Road and Ti Rakau Drive / Mattson Road intersections

Ti Rakau Drive is a congested corridor in the existing environment; therefore, it is likely that a redistribution of traffic or reduction in capacity due to road works will lead to increased queues and delays. It should also be noted that these increases in travel times are temporary. Once constructed the RRF will, in part, alleviate the congestion around the Pakuranga Town Centre and improve travel times for general traffic (see **Section 5.2.3.2**). Also, the completion of EB2 and EB3R is expected to further improve travel times, by means of the new RRF and dedicated bus lanes (see **Section 6.3.3**). Furthermore, increases in travel times through the project area are inherent in the majority of transport projects of this scale, and in light of the improvements that will be experienced once completed, this level of delay is considered to be acceptable.

Nevertheless, to mitigate these effects, appropriate public communication and advance warning of the planned works will be undertaken prior to the works being initiated. Public communication and signage will also be provided during construction informing motorists of the works and potential delays, which would lead to changes in travel behaviour such as travelling outside the peak periods or using alternative routes. This will be achieved through the CTMP.

During the AM peak period, travel times of the eastbound routes are predicted to experience small improvements or in some cases manageable increases.

Route travel times during the PM peak, in all directions, are expected to experience small improvements, or is some cases manageable increases under Construction Scenario 1. Although this level of effects does not require mitigation, public communication and advance warning of the planned works will still be undertaken prior to the works as well as during construction, along with appropriate signage of expected travel times and possible alternative routes.

#### *5.2.3.2 Construction Scenario 2*

**Table 31** provides a comparison of the route travel times between the Do-Minimum and Construction Scenario 2, with a 2028 horizon year.

**Table 31: General traffic travel times – Do-Minimum vs Construction Scenario 2 (2028)**

| AM Peak | | | | | | |
|---|---|---|---|---|---|---|
| Route | Westbound | | | Eastbound | | |
| | Do Minimum [min] | Construction 2 [min] | Difference [min] | Do Minimum [min] | Construction 2 [min] | Difference [min] |
| Botany - Pakuranga | 24.7 | 22.9 | -1.8 | 13.9 | 14.4 | 0.5 |
| Botany - SEART | 20.9 | 19.0 | -1.8 | 13.7 | 12.5 | -1.2 |
| Howick - Pakuranga | 5.3 | 12.5 | 7.3 | 4.7 | 5.4 | 0.7 |
| Howick - SEART | 11.6 | 8.9 | -2.7 | 8.0 | 6.2 | -1.8 |
| **PM Peak** | | | | | | |
| Route | Westbound | | | Eastbound | | |
| | Do Minimum [min] | Construction 2 [min] | Difference [min] | Do Minimum [min] | Construction 2 [min] | Difference [min] |
| Botany - Pakuranga | 18.4 | 16.1 | -2.3 | 24.6 | 26.4 | 1.8 |
| Botany - SEART | 11.6 | 9.3 | -2.3 | 24.5 | 26.3 | 1.8 |
| Howick - Pakuranga | 4.7 | 7.3 | 2.6 | 3.4 | 3.9 | 0.5 |
| Howick - SEART | 5.0 | 3.0 | -2.0 | 7.5 | 10.6 | 3.1 |

The westbound route from Howick to Pakuranga is predicted to experience an increase in travel time during the AM peak period. This is likely due to the operation of the newly completed Pakuranga Road / RRF intersection. The right turn from Pakuranga Road east towards Pakuranga Road west is treated as the minor movement, and the majority of the traffic signal green time is allocated to the through movements between Pakuranga Road east and the RRF.

As the operation of this intersection as well as the wider network is a balance of not only the various movements of traffic flows, but also the competing modes of transport, the trade-off is the improvement of travel times of the other routes. Particularly the improvement in travel times for the major routes from Botany and Howick towards SEART. It should also be noted that this increase in travel time is temporary. Upon completion of EB2 and EB3R, travel time for this route is expected to be improved (see **Section 6.3.3**), compared to Construction Scenario 2. As above, travel time increases are generally inherent in construction projects of this scale, and in context of the improvements that will be experienced once completed, this level of delay is considered to be acceptable.

The remaining westbound routes and all of the eastbound routes are predicted to experience small improvements or in some cases negligible increases in travel time during the AM peak period.

During the PM peak period, route travel times under Construction Scenario 2, are predicted to experience negligible increases or small improvements, in all directions.

Again, public communication and advance warning of the planned works will be undertaken prior to the works as well as during construction, along with appropriate signage of expected travel times and possible alternative routes. This will be achieved through the CTMP.

#### *5.2.3.3 Construction Scenario 3*

**Table 32** provides a comparison of the route travel times between the Do-Minimum and Construction Scenario 3, with a 2028 horizon year.

**Table 32: General traffic travel times – Do-Minimum vs Construction Scenario 3 (2028)**

| AM Peak | | | | | | |
|---|---|---|---|---|---|---|
| Route | Westbound | | | Eastbound | | |
| | Do Minimum [min] | Construction 3 [min] | Difference [min] | Do Minimum [min] | Construction 3 [min] | Difference [min] |
| Botany - Pakuranga | 24.7 | 21.6 | -3.1 | 13.9 | 10.6 | -3.3 |
| Botany - SEART | 20.9 | 18.9 | -2.0 | 13.7 | N/A | N/A |
| Howick - Pakuranga | 5.3 | 3.5 | -1.8 | 4.7 | 3.4 | -1.3 |
| Howick - SEART | 11.6 | 3.0 | -8.6 | 8.0 | 4.0 | -4.0 |
| **PM Peak** | | | | | | |
| Route | Westbound | | | Eastbound | | |
| | Do Minimum [min] | Construction 3 [min] | Difference [min] | Do Minimum [min] | Construction 3 [min] | Difference [min] |
| Botany - Pakuranga | 18.4 | 26.0 | 7.6 | 24.6 | 12.4 | -12.2 |
| Botany - SEART | 11.6 | 23.6 | 12.0 | 24.5 | N/A | N/A |
| Howick - Pakuranga | 4.7 | 4.2 | -0.5 | 3.4 | 3.7 | 0.3 |
| Howick - SEART | 5.0 | 2.8 | -2.2 | 7.5 | 4.9 | -2.6 |

It should be noted that Construction Scenario 3 is planned to occur during a low traffic period and for a short duration, such as December to January. Therefore, as discussed above background traffic volumes are predicted to be 40% lower, in line with historical seasonal fluctuations.

During Construction Scenario 3, the right turn lanes from SEART onto Ti Rakau Drive (eastbound) will be temporarily closed to enable the construction of the intersection. Therefore, a route travel time for the eastbound route from SEART to Botany could not be determined. Vehicles will head along the RRF and Pakuranga Road towards Cascades Road to travel to Botany.

During the AM peak period, all westbound and eastbound routes are predicted to experience improvements in travel times compared to the Do-Minimum.

The westbound routes from Botany to Pakuranga and SEART are predicted to experience relatively large increases in travel times during the PM peak period. This is not unexpected and is likely due to the ongoing construction, and associated lane closures at the Ti Rakau Drive / Reeves Road intersection.

As noted above, Ti Rakau Drive is a constrained corridor in the existing environment, especially near the Ti Rakau Drive / Reeves Road / SEART intersection. Therefore, it is likely that a reduction in roadway capacity due to road works will lead to increased queues and delays. However, it should be noted that these increases in travel times are temporary. Again, travel time increases are generally inherent in construction projects of this scale, and in context of the improvements that will be experienced once completed, this level of delay is considered to be acceptable. The completion of EB2 and EB3R is expected to improve travel times (see **Section 6.3.3**), as the roadway is opened to full capacity.

Nevertheless, to mitigate these effects appropriate public communication and advance warning of the planned works will be undertaken prior to the works being initiated. Public communication and signage will also be provided during construction informing motorists of the works and potential delays, which would lead to changes in travel behaviour such as travelling outside the peak periods or using alternative routes. This will be achieved through the CTMP.

The remaining westbound and eastbound routes are predicted to experience improvements, or in some cases negligible increases, in travel times during the PM peak period under Construction Scenario 3.

### 5.2.4 Summary of Temporary General Traffic Effects

Overall, the temporary effects on intersection performance during all construction scenarios across the EB2 and EB3R network are considered to be negligible or very low. The construction of the Ti Rakau Drive / Reeves Road / SEART and Ti Rakau Drive / Gossamer Drive intersections is proposed to be undertaken during a low traffic period (December-January) to mitigate the potential effects of disruption.

Analysis indicated that the temporary signalisation of the Pakuranga Road / William Roberts Road intersection, to support the operation of the construction yard, is expected to lead to improved intersection performance. Also, it was determined that the signalised midblock pedestrian crossing on Pakuranga Road will need to be disabled temporarily to mitigate queues on Pakuranga Road potentially blocking through the Pakuranga Road / Ti Rakau Drive intersection. A temporary traffic signal will be provided at the Ti Rakau Drive / Edgewater Drive east intersection during the construction of the Ti Rakau Drive / Edgewater Drive west intersection. This will ensure that signalised movements for vehicles turning into and out of Edgewater Drive are maintained.

Although the temporary effects to intersection performance during construction are predicted to be negligible or very low, some adverse effects to general traffic travel times are expected, particularly during Construction Scenario 1. These effects are not unexpected due to the number of ongoing construction activities. It should be noted that these effects are temporary, and once constructed, the RRF and EB2/EB3R as a whole will alleviate congestion, particularly around the Pakuranga Town Centre. Increases in travel times through the project area are inherent in the majority of transport projects of this scale, and in light of the improvements that will be experienced once completed, this level of delay is considered to be acceptable.

Nevertheless, to mitigate these effects, appropriate public communication and advance warning of the planned works will be undertaken prior to the works being initiated. Public communication and signage will also be provided during construction informing motorists of the works and potential delays, which would lead to changes in travel behaviour such as travelling outside the peak periods or using alternative routes. This will be achieved through the CTMP.

## 5.3 Effects to Bus Services and Facilities

The sections below provide details and assessment of the temporary effects during construction to bus services and facilities in the EB2 and EB3R project areas. **Figure 73** shows the existing bus services operating through the project areas. These include the 70, 72C, 72M, 72X, 352, 711 and 712 services.

School bus service operating in the EB2 and EB3R project areas include the following:

- S415 – Pakuranga to Sacred Heart College
- S416 – Botany Downs to Sacred Heart College
- S440 – Bucklands Beach to Sancta Maria College
- S013 – Otara to Edgewater College
- S073 – Otahuhu to Edgewater College

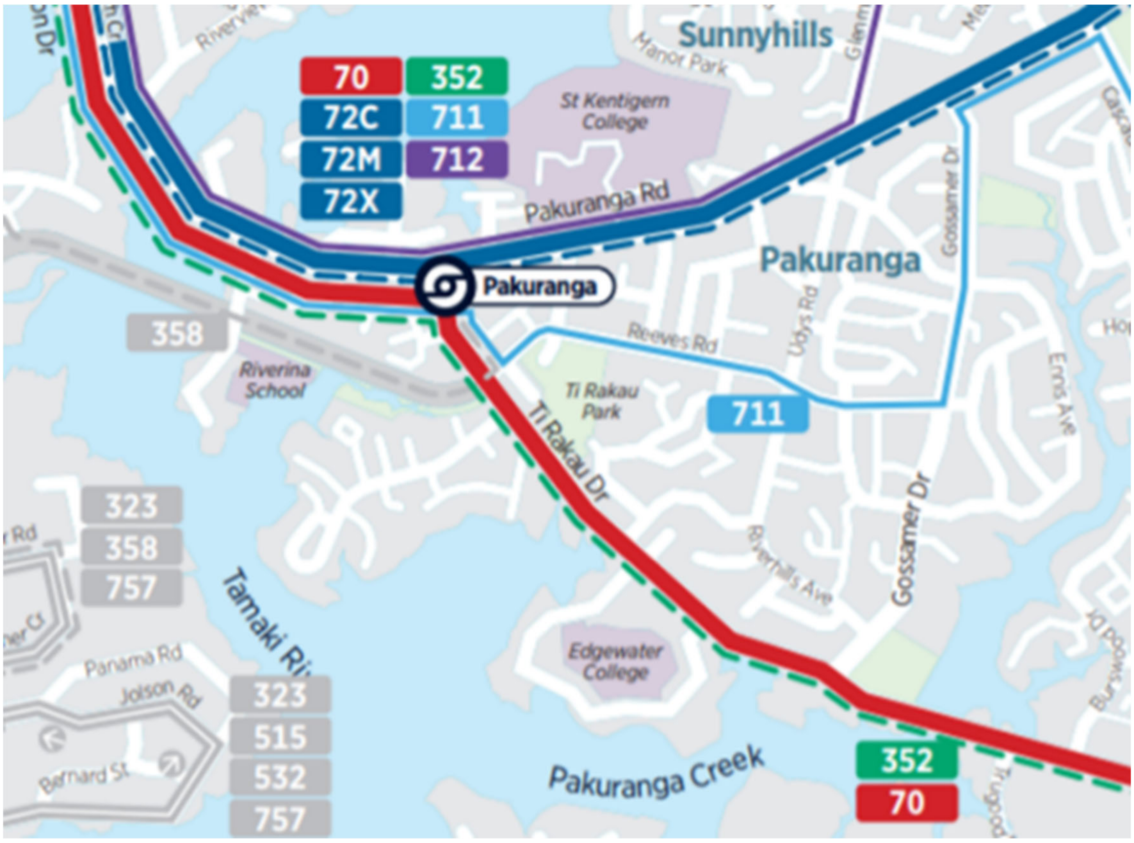



**Figure 73: Existing bus services in the EB2 and EB3R project areas**

### 5.3.1 EB2 – Reeves Road

At present, the 711 service travels partly along Reeves Road as a connector service between Howick and Panmure. During the Reeves Road closure, the 711 outbound (eastbound) service will be diverted temporarily to the newly completed WRRE (see **Figure 74**).


**Figure 74: 711 outbound service, existing and proposed routes**

The increase in distance of approximately 270 m and the resultant increase in travel time (20s) are considered negligible. It is noted that currently there are no bus stops located along Reeves Road between Ti Rakau Drive and William Roberts Road utilised by the 711 outbound service.

### 5.3.2 EB2 – William Roberts Road North

Currently, the 711 inbound (westbound) service travels partly along William Roberts Road north. Once William Roberts Road north is closed, the 711 inbound service will be diverted temporarily to William Roberts Road south and along Ti Rakau Drive (see **Figure 75**).


**Figure 75: 711 inbound service, existing and proposed routes**

The increase in distance of approximately 290 m and the resultant increase in travel time (21s) are considered to be negligible.

At present, the 711 inbound service utilises bus stop (ID 6060) to pick-up / drop-off passengers at the Pakuranga Plaza. Once William Roberts Road north is closed and until Reeves Road reopens, the 711 inbound service will utilise bus stop (ID 6127) instead.

The Pakuranga Road / Ti Rakau Drive intersection is located approximately 160 m north and the Ti Rakau Drive / Reeves Road intersection is located approximately 188 m south from the bus stop (ID 6127). Therefore, the increase in pedestrian walking distance to the Pakuranga Plaza is considered to be negligible.

Lewis Road was an alternative route considered during this assessment. However, Lewis Road is not well suited to buses given its narrow carriageway and on-street parking on both sides. Therefore, this alternative was discounted.

### 5.3.3 EB2 – Ti Rakau Drive and Pakuranga Road

**Figure 76** shows the existing bus stops near the Pakuranga Town Centre, located on Ti Rakau Drive and Pakuranga Road in the EB2 project area.


**Figure 76: Pakuranga Plaza bus stops**

During construction of the new bus lanes on the northern side of Ti Rakau Drive, as well as the new bus station (Phase 1 of Ti Rakau Drive in EB2, see **Section 4.2.1.5**), it is anticipated that bus stop (ID 6132) will be maintained as existing. Once this phase of work has been completed, the bus stop will be removed permanently, and the new bus station will be utilised.

Currently, this bus stop is located in-lane on Ti Rakau Drive eastbound, whereas in the future the bus station will provide indented bus bays for improved operation and safety. The remaining bus stops will remain at their current locations following this phase of work. This is due to the ongoing Reeves Road works at this stage. Bus services that will benefit from this initial improvement include the 70 outbound, 352 outbound and the 711 outbound.

Following the completion of the RRF and Reeves Road modifications, it is anticipated that the bus stops (ID 6062, 6060 and 6127) will also be removed with bus services utilising the new bus station. The bus services that will benefit from the new bus station include the 70, 72C, 72M, 72X, 352, 711 and 712.

### 5.3.4 EB3R – Ti Rakau Drive

**Figure 77** shows the existing bus stops on Ti Rakau Drive in the EB3R project area.


**Figure 77: EB3R Ti Rakau Dr bus stops**

During construction of Phase 1 of Ti Rakau Drive (between Mattson Road and Gossamer Drive) in EB3R (see **Section 4.2.2.3**), which will consist of the new westbound lanes on Ti Rakau Drive, bus stops (ID 6129, 6131 and 6133) will largely be kept in accordance with the current arrangement. It is expected that the bus stops will need to shift longitudinally as the works progress. However, the effects to bus services and passengers are expected to be negligible. The eastbound bus station at Gossamer Drive will also be constructed during Phase 1, however, it will not be operational until the completion of Phase 3 of EB3R.

Once Phase 1 is completed, these bus stops will be temporarily relocated to the new westbound lanes, in close proximity to their current locations and will operate until the completion of Phase 2 of EB3R.

Phase 2 of Ti Rakau Drive in EB3R (see **Section 4.2.2.4**) will consist of the central running bus lanes, as well as the new bus station at Edgewater Drive and the westbound bus station at Gossamer Drive. As above, the Gossamer Drive bus station will not be operational until completion of Phase 3 of EB3R.

Upon completion of Phase 2, it is anticipated that the bus stops (ID 6134, 6129, 6131, 6136, 6138 and 6133) will be removed permanently. The new Edgewater Drive bus station will provide improved bus services and facilities, as well as greater pedestrian safety and amenity.

In Phase 3 of Ti Rakau Drive in EB3R (see **Section 4.2.2.5**), the Ti Rakau Drive / Gossamer Drive intersection will be constructed, which will provide a link between the western and eastern bus stations at Gossamer Drive. It is expected that following Phase 3, bus stops (ID 6140 and 6135) will be removed permanently. The new bus station will provide improved bus services and facilities, as well as greater pedestrian safety and amenity.

### 5.3.5 Bus Travel Times

Bus route travel times were determined using the AIMSUN model, with a 2028 horizon year. Travel times were determined in both directions during AM and PM peak periods for the following routes:

- 70 – Botany to Auckland CBD
- 72C – Botany and Howick to Panmure
- 72M – Botany and Howick to Panmure
- 72X – Botany and Howick to Auckland CBD
- 352 – Manukau to Panmure
- 711 – Howick to Panmure
- 712 – Bucklands Beach to Panmure

The sections below assess the temporary effects on bus travel times during the construction scenarios.

#### *5.3.5.1 Construction Scenario 1*

**Table 33** below provides a comparison of the bus route travel times between the Do-Minimum and Construction Scenario 1, with a 2028 horizon year.

**Table 33: Bus travel times – Do-Minimum vs Construction Scenario 1 (2028)**

| AM Peak | | | | | | |
|---|---|---|---|---|---|---|
| Route Description | Westbound | | | Eastbound | | |
| | Do Minimum [min] | Construction 1 [min] | Difference [min] | Do Minimum [min] | Construction 1 [min] | Difference [min] |
| 70 – Botany to Auckland CBD | 42.3 | 59.6 | 17.3 | 26.9 | 31.3 | 4.4 |
| 72C – Botany and Howick to Panmure | 20.6 | 42.7 | 22.1 | 16.0 | 15.7 | -0.3 |
| 72M – Botany and Howick to Panmure | - | - | - | 15.8 | 15.9 | 0.1 |
| 72X – Botany and Howick to Auckland CBD | 24.6 | 48.9 | 24.3 | - | - | - |
| 352 – Manukau to Panmure | 36.8 | 46.2 | 9.4 | 29.1 | 29.0 | -0.1 |
| 711 – Howick to Panmure | 29.1 | 35.2 | 6.1 | 22.7 | 24.0 | 1.3 |
| 712 – Bucklands Beach to Panmure | 22.6 | 30.6 | 8.0 | 16.6 | 15.5 | -1.1 |

| PM Peak | | | | | | |
|---|---|---|---|---|---|---|
| Route Description | Westbound | | | Eastbound | | |
| | Do Minimum [min] | Construction 1 [min] | Difference [min] | Do Minimum [min] | Construction 1 [min] | Difference [min] |
| 70 – Botany to Auckland CBD | 35.7 | 31.7 | -4.0 | 38.1 | 37.5 | -0.6 |
| 72C – Botany and Howick to Panmure | 14.6 | 14.4 | -0.2 | 14.8 | 14.4 | -0.4 |
| 72M – Botany and Howick to Panmure | 15.0 | 14.3 | -0.7 | - | - | - |
| 72X – Botany and Howick to Auckland CBD | - | - | - | 16.8 | 19.4 | 2.6 |
| 352 – Manukau to Panmure | 33.4 | 29.6 | -3.8 | 27.9 | 27.3 | -0.6 |
| 711 – Howick to Panmure | 23.8 | 26.1 | 2.3 | 24.5 | 24.8 | 0.3 |
| 712 – Bucklands Beach to Panmure | 19.7 | 18.5 | -1.2 | 18.1 | 18.3 | 0.2 |

Bus travel times of the 70 and 352 services (westbound), along Ti Rakau Drive, are predicted to experience relatively large increases during the AM peak period under Construction Scenario 1. This is not unexpected given the following factors:

- The addition of the new Ti Rakau Drive / William Roberts Road intersection to the network
- The closure of Reeves Road and William Roberts Road north, whereby more vehicles are likely to divert to Ti Rakau Drive
- Ongoing construction of the Pakuranga Road / RRF tie-in, whereby more vehicles are likely to divert to Ti Rakau Drive
- Ongoing construction of the staggered-T arrangement of the Ti Rakau Drive / William Roberts Road and Ti Rakau Drive / Mattson Road intersections

Furthermore, with the closure of Reeves Road and with the RRF not completed at this stage, large queues are predicted in the westbound kerbside lane on Ti Rakau Drive as vehicles attempt to turn onto SEART. As the existing bus stops along Ti Rakau Drive are located along the kerbside lane, buses are likely to travel in this congested lane, resulting in increased travel times. Therefore, the effects to bus travel times are considered to be moderate.

However, Ti Rakau Drive is a congested corridor in the existing environment; therefore, it is expected that a redistribution of traffic or reduction in capacity due to road works will lead to increased queues and delays. It should also be noted that these increases in travel times are temporary. Once constructed the RRF will, in part, alleviate the congestion around the Pakuranga Town and improve travel times (see **Section 5.3.5.2**). Furthermore, the completion of EB2 and EB3R is expected to further improve travel times, by means of the new dedicated bus lanes (see **Section 6.4.7**). As discussed in **Section 5.2.3**, travel time increases are generally inherent in construction projects of this scale, and in context of the improvements that will be experienced once completed, this level of delay is considered to be acceptable.

Opportunities to improve bus travel times will be explored in the development of the CTMPs, such as the provision of temporary bus priority where feasible. Appropriate public communication and advance warning of the planned works will be undertaken prior to the works being initiated. Public communication and signage will also be provided during construction informing motorists of the works and potential delays, which could lead to changes in travel behaviour such as travelling outside the peak periods or using alternative routes.

Bus travel times of the 72C and 72X services (westbound), along Pakuranga Road, are also predicted to experience increases during the AM peak period. This likely due to the closure of Reeves Road and the RRF not being constructed yet. Large queues are also predicted in the westbound kerbside lane on Pakuranga Road as vehicles attempt to turn left onto Ti Rakau Drive towards SEART. Again, buses are likely to travel in this congested lane, resulting in increased travel times.

As above, opportunities to improve bus travel times will be explored in the development of the CTMPs, such as the provision of temporary bus priority or temporary bus lanes where feasible.

It should be noted that the 72M (westbound) and 72X (eastbound) services do not operate during the AM peak period.

The 711 and 712 services (westbound) and all of the eastbound services are predicted to experience manageable increases, or in some cases small improvements, in travel times during the AM peak period under Construction Scenario 1.

All services in both directions are predicted to experience manageable increases, or in some cases small improvements, in travel time during the PM peak period under Construction Scenario 1.

#### *5.3.5.2 Construction Scenario 2*

**Table 34** provides a comparison of the bus route travel times between the Do-Minimum and Construction Scenario 2, with a 2028 horizon year.

**Table 34: Bus travel times – Do-Minimum vs Construction Scenario 2 (2028)**

| AM Peak | | | | | | |
|---|---|---|---|---|---|---|
| Route Description | Westbound | | | Eastbound | | |
| | Do Minimum [min] | Construction 2 [min] | Difference [min] | Do Minimum [min] | Construction 2 [min] | Difference [min] |
| 70 – Botany to Auckland CBD | 42.3 | 30.6 | -11.7 | 26.9 | 22.8 | -4.1 |
| 72C – Botany and Howick to Panmure | 20.6 | 25.6 | 5.0 | 16.0 | 16.1 | 0.1 |
| 72M – Botany and Howick to Panmure | - | - | - | 15.8 | 15.9 | 0.1 |
| 72X – Botany and Howick to Auckland CBD | 24.6 | 30.2 | 5.6 | - | - | - |
| 352 – Manukau to Panmure | 36.8 | 25.7 | -11.1 | 29.1 | 22.5 | -6.6 |
| 711 – Howick to Panmure | 29.1 | 32.7 | 3.6 | 22.7 | 25.7 | 3.0 |
| 712 – Bucklands Beach to Panmure | 22.6 | 27.3 | 4.7 | 16.6 | 15.8 | -0.8 |

| PM Peak | | | | | | |
|---|---|---|---|---|---|---|
| Route Description | Westbound | | | Eastbound | | |
| | Do Minimum [min] | Construction 2 [min] | Difference [min] | Do Minimum [min] | Construction 2 [min] | Difference [min] |
| 70 – Botany to Auckland CBD | 35.7 | 29.2 | -6.5 | 38.1 | 36.2 | -1.9 |
| 72C – Botany and Howick to Panmure | 14.6 | 18.6 | 4.0 | 14.8 | 14.8 | 0.0 |
| 72M – Botany and Howick to Panmure | 15.0 | 19.8 | 4.8 | - | - | - |
| 72X – Botany and Howick to Auckland CBD | - | - | - | 16.8 | 17.7 | 0.9 |
| 352 – Manukau to Panmure | 33.4 | 27.1 | -6.3 | 27.9 | 25.1 | -2.8 |
| 711 – Howick to Panmure | 23.8 | 25.7 | 1.9 | 24.5 | 24.0 | -0.5 |
| 712 – Bucklands Beach to Panmure | 19.7 | 24.8 | 5.1 | 18.1 | 18.7 | 0.6 |

The completion of the RRF is predicted to result in improved travel times of bus routes under Construction Scenario 2, compared to Construction Scenario 1. This is due to a significant redistribution of general traffic from Ti Rakau Drive to the RRF.

Significant improvements in bus travel times of the 70 and 352 (westbound) services are predicted during the AM peak. The 70 and 352 (eastbound) services are predicted to experience more modest travel time improvements.

The remaining westbound and eastbound services are predicted to experience manageable increases, or in some cases small improvements, in travel times during the AM peak under Construction Scenario 2.

Similar to the AM peak, travel times of the 70 and 352 services along Ti Rakau Drive are expected to experience improvements, in both directions, during the PM peak.

Again, travel times of the remaining westbound and eastbound services are expected to experience manageable increases or small improvements during the PM peak under Construction Scenario 2.

#### 5.3.5.3 Construction Scenario 3

**Table 35** provides a comparison of the bus route travel times between the Do-Minimum and Construction Scenario 3, with a 2028 horizon year.

**Table 35: Bus travel times – Do-Minimum vs Construction Scenario 3 (2028)**

| AM Peak | | | | | | |
|---|---|---|---|---|---|---|
| Route Description | Westbound | | | Eastbound | | |
| | Do Minimum [min] | Construction 3 [min] | Difference [min] | Do Minimum [min] | Construction 3 [min] | Difference [min] |
| 70 – Botany to Auckland CBD | 42.3 | 35.7 | -6.6 | 26.9 | 20.4 | -6.5 |
| 72C – Botany and Howick to Panmure | 20.6 | 15.8 | -4.8 | 16.0 | 14.2 | -1.8 |
| 72M – Botany and Howick to Panmure | - | - | - | 15.8 | 14.5 | -1.3 |
| 72X – Botany and Howick to Auckland CBD | 24.6 | 20.2 | -4.4 | - | - | - |
| 352 – Manukau to Panmure | 36.8 | 30.0 | -6.8 | 29.1 | 18.7 | -10.4 |
| 711 – Howick to Panmure | 29.1 | 30.0 | 0.9 | 22.7 | 19.5 | -3.2 |
| 712 – Bucklands Beach to Panmure | 22.6 | 16.5 | -6.1 | 16.6 | 13.4 | -3.2 |
| **PM Peak** | | | | | | |
| Route Description | Westbound | | | Eastbound | | |
| | Do Minimum [min] | Construction 3 [min] | Difference [min] | Do Minimum [min] | Construction 3 [min] | Difference [min] |
| 70 – Botany to Auckland CBD | 35.7 | 39.3 | 3.6 | 38.1 | 22.1 | -16.0 |
| 72C – Botany and Howick to Panmure | 14.6 | 17.4 | 2.8 | 14.8 | 14.4 | -0.4 |
| 72M – Botany and Howick to Panmure | 15.0 | 19.1 | 4.1 | - | - | - |
| 72X – Botany and Howick to Auckland CBD | - | - | - | 16.8 | 16.5 | -0.3 |
| 352 – Manukau to Panmure | 33.4 | 34.9 | 1.5 | 27.9 | 18.5 | -9.4 |
| 711 – Howick to Panmure | 23.8 | 29.1 | 5.3 | 24.5 | 19.6 | -4.5 |
| 712 – Bucklands Beach to Panmure | 19.7 | 18.8 | -0.9 | 18.1 | 14.4 | -3.7 |

As Construction Scenario 3 simulates a lower traffic period, compared to Construction Scenario 1 and 2, bus travel times are naturally expected to be lower even with the ongoing construction activities at the Ti Rakau Drive / Reeves Road / SEART and Ti Rakau Drive / Gossamer Drive.

Improvements in travel times of all bus services in both directions are predicted in the AM peak under Construction Scenario 3, except for the 711 (westbound) service. Travel time increases predicted for this service are considered to be negligible.

Travel time improvements, or in some cases manageable increases, are expected for the bus services running through the EB2 and EB3R project areas during the PM peak under Construction Scenario 3.

### 5.3.6 School Bus Services

The S415 school bus service between Pakuranga and Sacred Heart College will continue to depart from bus stop (ID 6060) outside Farmers in the AM peak and will continue to terminate at bus stop (ID 6062) on the return journey in the afternoon during construction. Furthermore, the service will also continue to travel in the general traffic lanes on Pakuranga Road during construction. As stated in **Section 5.3.3**, it is anticipated that the bus stops (ID 6062 and 6060) will only be removed following the completion of the RRF and Reeves Road underneath.

The S416 school bus service between Botany and Sacred Heart College will continue to use the general traffic lanes along Ti Rakau Drive as well as the existing bus stops in the EB2 and EB3R projects areas during construction. As stated in **Section 5.3.3**, it is anticipated that the bus stop (ID 6127) in the Pakuranga Town Centre will only be removed after the RRF, and Reeves Road have been completed. Also, as stated in **Section 5.3.4**, it is anticipated that bus stops (ID 6134, 6129, 6131, 6136, 6138 and 6133) along Ti Rakau Drive will only be removed following Phase 2 of Ti Rakau Drive in EB3R (Mattson Road to Gossamer Drive) and bus stops (ID 6140 and 6135) following Phase 3 of EB3R.

During construction, the S440 school bus services between Bucklands Beach and Sancta Maria College and Primary will remain on its current route and students will board and alight at the existing bus stops. The service is unlikely to be affected by Phase 3a of Ti Rakau Drive in EB3R (Mattson Road to Gossamer Drive), as the works are planned to occur during a December – January holiday period.

Effects to the S013 and S073 school bus services between Otara and Otahuhu to Edgewater College during construction are discussed in **Section 5.5.6.5**. School bus services are expected to experience similar effects to travel times compared to general bus services (see **Section 5.3.5.1** and **Section 5.2.3.2**) as the buses are generally expected to travel in the same lanes through the network.

### 5.3.7 Summary of Temporary Effects to Bus Services and Facilities

Overall, the temporary effects during construction to bus services and facilities in the EB2 and EB3R project areas are considered to be moderate during Construction Scenario 1, and negligible or very low during Construction Scenario 2 and 3. The 711 service will undergo minor route changes as construction progresses through the closure of Reeves Road and William Roberts Road north. Existing bus stops along Pakuranga Road and Ti Rakau Drive will also experience minor changes during construction, undergoing minor relocation as the works progress.

As with general traffic, although the temporary effects to intersection performance during construction are predicted to be negligible or very low, some adverse effects to bus travel times are expected, particularly during Construction Scenario 1. Again, these effects are not unexpected due to the number of ongoing construction activities. It should be noted that these effects are temporary, and once constructed, the RRF and EB2/EB3R as a whole will alleviate the congestion around the Pakuranga Town Centre.

Nevertheless, opportunities to improve bus travel times will be explored in the development of the CTMPs. The effects of construction will be mitigated through public communication and advance warning prior to the works. Community engagement and signage will also be provided during construction to inform motorists of the works and potential delays, which would lead to changes in travel patterns.

## 5.4 Effects to Pedestrians and Cyclists

Currently, pedestrian footpaths are provided along both sides of Ti Rakau Drive, between Pakuranga Road and Gossamer Drive. Signalised pedestrian facilities for crossing Ti Rakau Drive are provided at the following intersections:

- Ti Rakau Drive / Pakuranga Road southern and eastern approaches
- Ti Rakau Drive / Reeves Road all approaches
- Ti Rakau Drive / Mattson Road Western and southern approaches
- Ti Rakau Drive / Edgewater Drive west / Chevis Place western and southern approaches
- Ti Rakau Drive / Gossamer Drive northern, eastern and southern approaches

Pedestrian footpaths are also provided along both sides of Pakuranga Road, between Ti Rakau Drive and William Roberts Road. A midblock signalised pedestrian crossing is provided near the Pepler Street exit.

In the residential area to the north of SEART, pedestrian footpaths are provided along both sides of Dale Crescent. At the southern end of the street, the footpath continues along the northern side of Seven Oaks Drive.

In the commercial area south of the Pakuranga Plaza, pedestrian footpaths are provided along both sides of Reeves Road and Cortina Place. A midblock pedestrian crossing is also provided on Reeves Road. Footpaths are provided along both sides of William Roberts Road north, to the east of the Pakuranga Plaza. Once the WRRE is completed, footpaths will be provided along both sides of William Roberts Road south, from Ti Rakau Drive up to Ti Rakau Park.

Provision of footpaths with the same width as existing footpaths will be provided during construction.

As stated in **Section 3.6.2**, no cycle facilities are provided in the existing environment, except at the Ti Rakau Drive / Gossamer Drive intersection.

Pedestrian crossings and footpaths will be maintained at all times during construction. Should this be unachievable, temporary facilities will be provided to ensure pedestrian connectivity. This will be ensured through the CTMPs.

### 5.4.1 EB2 – Reeves Road

Footpaths along both sides of Reeves Road as well as the midblock pedestrian crossing will be maintained during construction. When beam-landing activities are required for construction of the RRF, pedestrians may need to be diverted around these areas for safety purposes. CTMPs will be employed to achieve this.

### 5.4.2 EB2 – William Roberts Road North

Although construction is required to form the cul-de-sacs at each end, the existing footpaths along both sides of William Roberts Road north will be maintained. Once the RRF northern abutment is under construction, it is anticipated that the pedestrian footpath on the western side of William Roberts Road north will be closed. The effects of this closure are considered to be negligible as the footpath on the opposite side of the road will be maintained.

### 5.4.3 EB2 – Pakuranga Road Tie-In

The footpath along the northern side of the Pakuranga Road / RRF intersection will be maintained at all times. While the Pakuranga Road tie-in is under construction, pedestrians will be unable to utilise the existing refuge island on the southern side of the intersection. A temporary pedestrian crossing will be provided in a similar location to limit the effects to pedestrian walking time and distance.

### 5.4.4 EB2 – SEART

There are no footpaths along SEART provided at present.

Once the new SEART off-ramp has been completed and Seven Oaks Drive has been reinstated further north, it is anticipated that the footpath along the northern side of the Seven Oaks Drive will also be reinstated, similar to the existing environment.

### 5.4.5 EB2 – Ti Rakau Drive from Pakuranga Road to Reeves Road

Footpaths along both sides of the carriageway will be maintained. During the construction of the bus lanes on this section of Ti Rakau Drive as well as the new Ti Rakau Drive / Aylesbury Street / Palm Avenue crossroads intersection, pedestrians may need to be diverted around these areas for safety purposes. CTMPs will be employed to achieve this.

During construction of the Ti Rakau Drive / Reeves Road intersection, pedestrian crossings will be maintained. Temporary crossings will be provided as necessary to avoid the construction areas.

### 5.4.6 EB2 – Pakuranga Road

The existing footpaths along both sides of Pakuranga Road will be maintained during construction. The existing signalised midblock pedestrian crossing on Pakuranga Road, constructed as part of EB1, will be maintained for the vast majority of the construction programme. It will be disabled temporarily during the crossing drainage works.

### 5.4.7 EB2 – Side Roads

The existing footpaths along both sides of Palm Avenue, Aylesbury Street north, Cortina Place and William Roberts Road will be maintained. In the case of Aylesbury Street, the footpaths will be maintained until the completion of the new Ti Rakau Drive / Aylesbury Street / Palm Avenue crossroads intersection. Following which the existing footpaths will be removed. CTMPs will be employed to divert pedestrians around work zones as necessary.

### 5.4.8 EB3R – Ti Rakau Drive from Reeves Road to Mattson Road

Footpaths along both sides of the carriageway will be maintained. During construction of the Ti Rakau Drive / William Roberts Road and Ti Rakau Drive / Mattson Road intersections, temporary crossing facilities will be provided as per the CTMPs to avoid the work zones.

#### 5.4.9 EB3R – Ti Rakau Drive from Mattson Road to Gossamer Drive (Phase 1)

Pedestrian footpaths on both sides of Ti Rakau Drive will be maintained. A new three-stage pedestrian crossing will be constructed, between Marriot Road and Edgewater Drive west, during the construction of the new westbound lanes. However, this crossing will not be in use until the completion of the bus lanes and the Edgewater bus station in the centre of Ti Rakau Drive. Pedestrians will continue to use the existing pedestrian crossing at the Ti Rakau Drive / Edgewater Drive west intersection.

#### 5.4.10 EB3R – Ti Rakau Drive from Mattson Road to Gossamer Drive (Phase 2)

The footpath along the northern side of Ti Rakau Drive will be maintained, and pedestrians will be able to utilise the new footpath along the southern side during Phase 2. As above, the new staged pedestrian crossing towards the Edgewater bus station will not be in use until completion of the bus lanes and the bus station. A temporary signalised pedestrian crossing will be provided at the Ti Rakau Drive / Edgewater Drive west intersection.

#### 5.4.11 EB3R – Ti Rakau Drive from Mattson Road to Gossamer Drive (Phase 3)

During Phase 3, the staged pedestrian crossing at the Edgewater Drive bus station will be completed and will be opened for use. During construction of Ti Rakau Drive / Gossamer Drive intersection, pedestrian crossings will be maintained. Temporary crossings will be provided as necessary to avoid the construction areas, and will form part of the CTMP.

#### 5.4.12 EB3R – Side Roads

The existing footpaths along both sides of Tiraumea Drive, Mattson Road, Roseburn Place, Edgewater Drive west, Chevis Place, Wheatley Avenue, Edgewater Drive east, Freemantle Place and Gossamer Drive will be maintained during construction. CTMPs will be employed to divert pedestrians around work zones as necessary.

#### 5.4.13 Summary of Temporary Effects to Pedestrians and Cyclists

Temporary effects to pedestrians and cyclists during construction are considered to be negligible overall. Pedestrian crossings and footpaths will be maintained at all times during construction. Should this be unachievable, temporary facilities and diversions will be provided to ensure pedestrian connectivity. Furthermore, pedestrian access to properties will be maintained at all times. This will be ensured through the CTMPs.

## 5.5 Effects to Property Access and Parking

The sections below provide assessment of the temporary effects of EB2 and EB3R on property access, as well as on-street and off-street parking during construction, split between the EB2 and EB3R project areas.

### 5.5.1 EB2 – Reeves Road

The construction of Reeves Road will have no effect on on-street parking along this section of road as none is provided currently.

An assessment of temporary effects to property access and off-street parking at specific properties along Reeves Road in the EB2 project area is provided below.

#### *5.5.1.1 3 Reeves Road – Gull Service Station*

**Figure 78** shows the location and property boundary of 3 Reeves Road, as well as the Gull service station (red outline) developed on the site. Access to the property from Reeves Road will not be maintained during the Reeves Road closure. Discussions regarding compensation are ongoing with the owner regarding loss of direct road access onto Reeves Road as part of the Public Works Act process.


**Figure 78: 3 Reeves Rd and Gull service station (red outline)**

#### 5.5.1.2 11 Reeves Road – Eastside Pups Dog Grooming and Daycare

Access to the property at 11 Reeves Road will not be maintained during the closure of Reeves Road. A temporary two-way access will be provided from Cortina Place via the property at 2 Cortina Place (see **Figure 79**), which is owned by AT. The manoeuvring width between parking spaces to the rear of the property is approximately 8.4m and will be sufficient to accommodate a two-way temporary access, while having no effect on on-site parking. Therefore, the temporary effects to property access and parking are considered to be negligible.

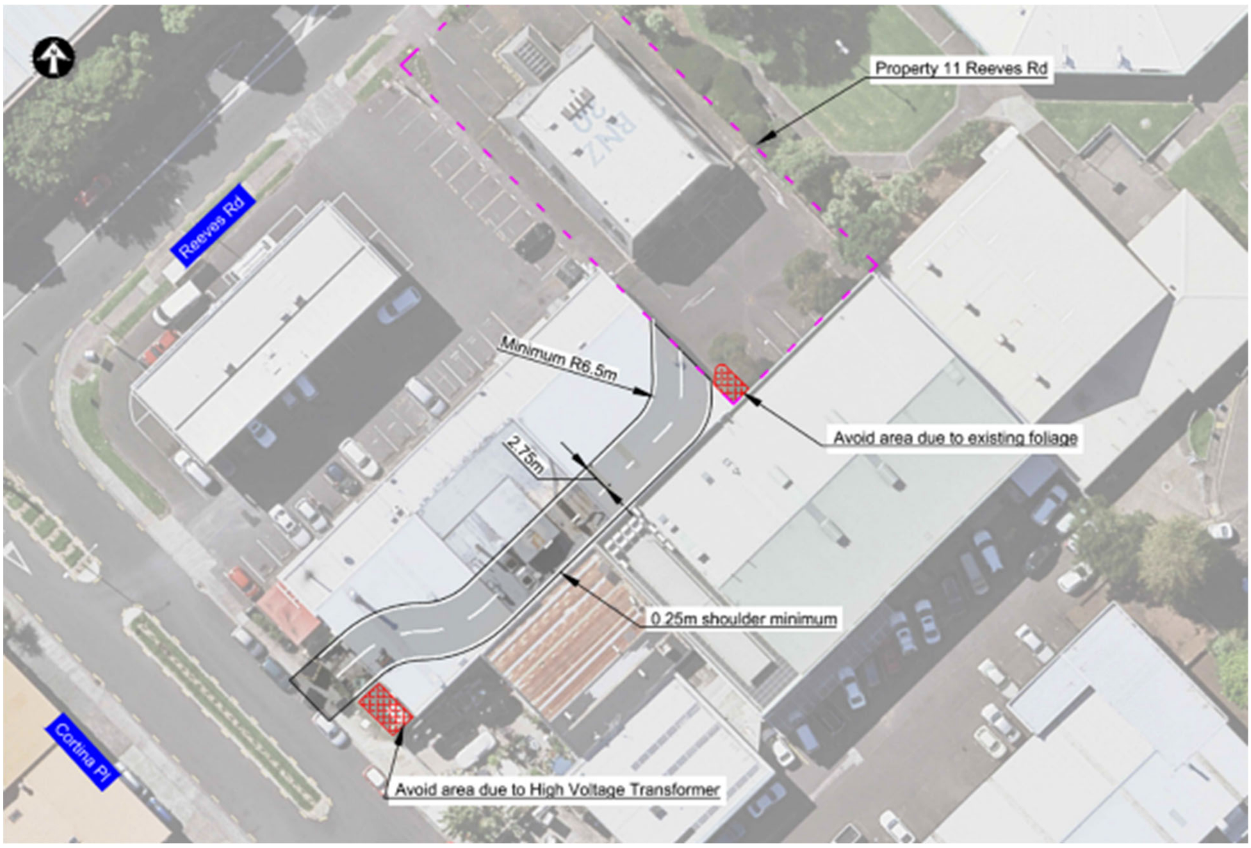



**Figure 79: 11 Reeves Rd temporary access during construction**

#### 5.5.1.3 7 Aylesbury Street and 2R Ti Rakau Drive – The Warehouse and Pakuranga Library

Currently, access is provided to The Warehouse's goods access and the associated undercover carpark at 7 Aylesbury Street from Reeves Road. Similarly, the service entrance of the Pakuranga Library and Citizens Advice Bureau at 2R Ti Rakau Drive is also accessed from Reeves Road.

During the initial stages of the Reeves Road closure, from June 2023 to April 2024[32], access will be maintained through the work site to the goods access and the service entrance of the library. Access to the undercover carpark from Reeves Road will not be maintained during this period. However, the existing secondary access to the undercover carpark off the private access road in the Pakuranga Plaza will remain open (see **Figure 80**). The main access to the Library on Aylesbury Street east will also remain open. Therefore, effects to property access during this period at these properties, as well as during events such as the Pakuranga Night Market, are expected to be very low.


**Figure 80: Pakuranga Plaza undercover carpark accesses**

It should be noted that during this period, access to the Pakuranga Plaza at the Reeves Road / Aylesbury Street east intersection will also not be maintained. A full assessment of effects to property access at the Pakuranga Plaza is presented in **Section 5.5.5.3**.

Following this initial period, and in addition to the accesses being maintained to The Warehouse and the Library, access will also be reinstated to the undercover carpark. These access arrangements are shown in **Figure 81** below.

[32] These periods are indicative, and the EBA is reviewing the design and construction methodology to accelerate construction.

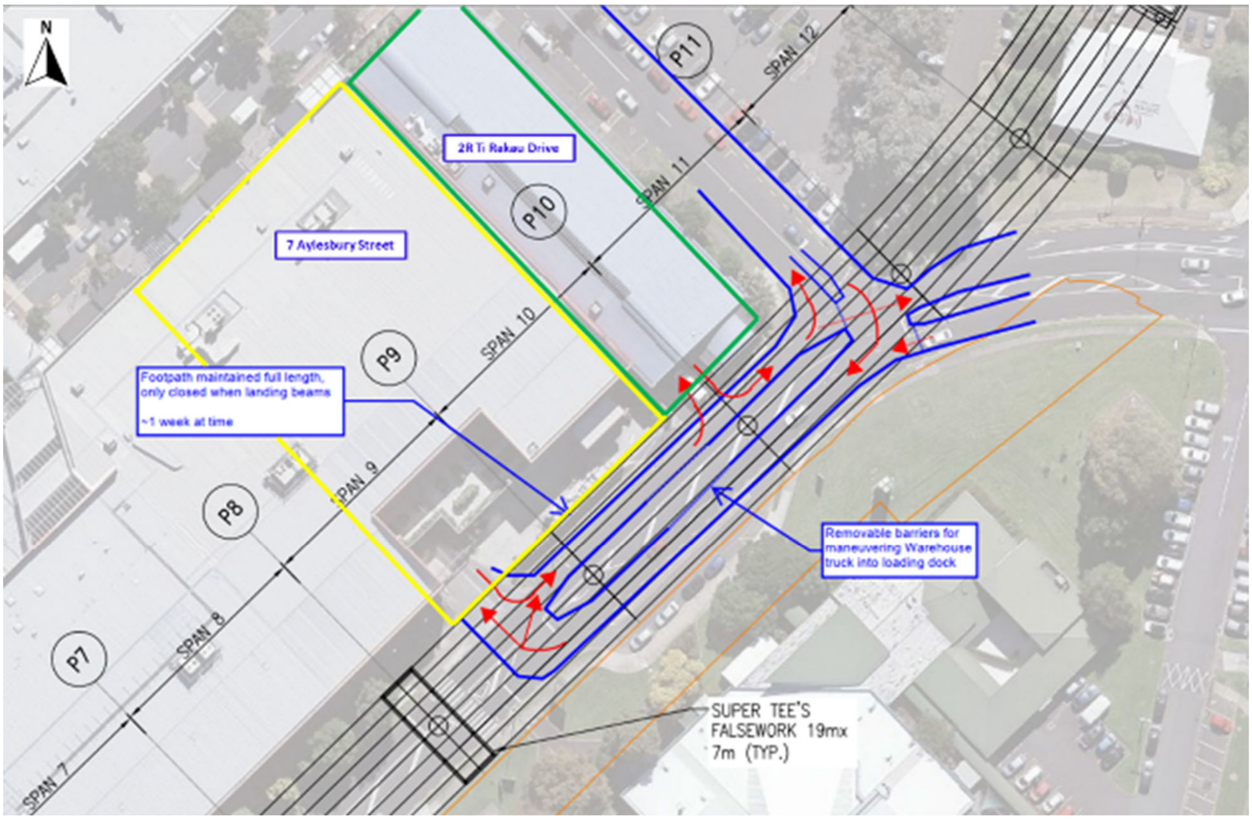



**Figure 81: 7 Aylesbury St and 2R Ti Rakau Dr temporary access during construction**

At present, The Warehouse's goods access is left-in left-out only, with trucks accessing the site via Reeves Road from the south and exiting to the north. Trucks will access the site from the north on Reeves Road, execute a U-turn and return northbound on Reeves Road towards William Roberts Road during construction.

Removeable barriers will be installed in the median and the existing masonry wall on the property boundary will be removed, if required, to accommodate this manoeuvre. The wall will be reinstated after construction of Reeves Road. Deliveries to the property are currently limited to one semi-trailer per day (as per the terms of the existing resource consent for the property) and background traffic volumes on Reeves Road will be significantly reduced.

Access to the undercover carpark will also be from the north on Reeves Road, turning right into the carpark. Left-out only movements will be provided at this access for vehicles exiting from the carpark.

Access to the service entrance of the Library will be from the north on Reeves Road, executing a U-turn manoeuvre at the undercover carpark access. During construction, this access will provide for left-in left-out movements only. Given the nature of the service access and its size, it is expected that a low number of vehicles would require access to this entrance during construction. Effects to property access are expected to be negligible as the existing background traffic on the road will be redistributed elsewhere during the Reeves Road closure.

### 5.5.1.4 13R Reeves Road – Te Tuhi

The main access to the property off Reeves Road will not be maintained during the Reeves Road closure. A temporary indented drop-off area will be provided on the western side of William Roberts Road, with a temporary walkway leading around the property to the main entrance (see **Figure 82**).

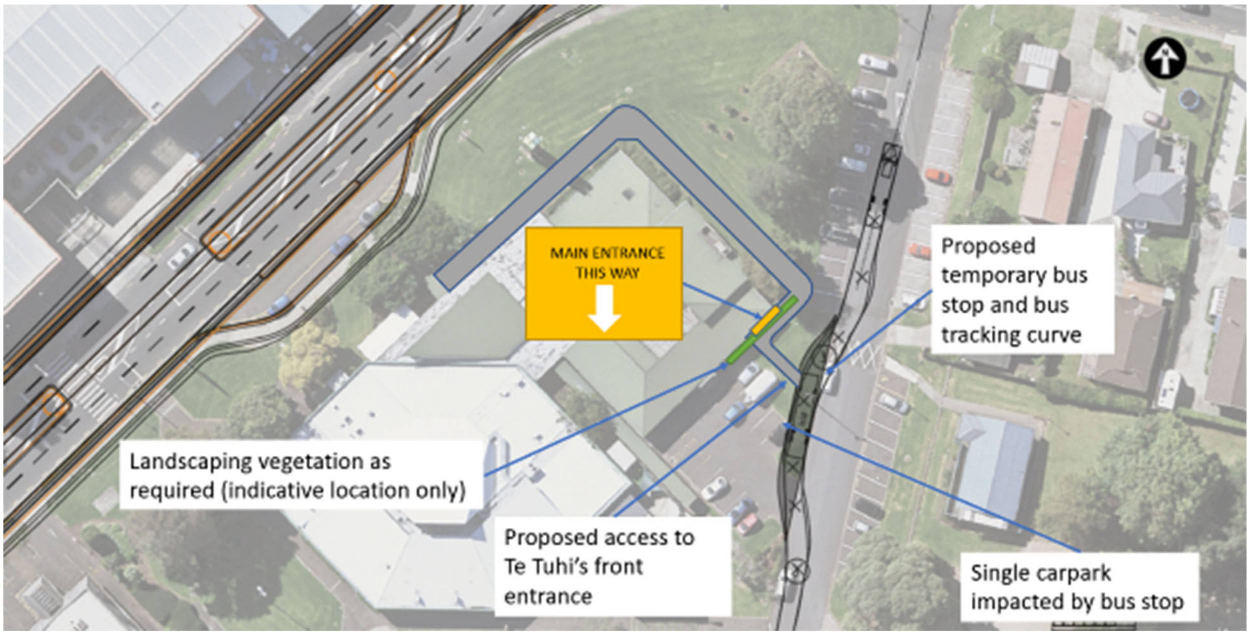



**Figure 82: 13R Reeves Rd temporary access during construction**

The drop-off will result in the temporary loss of one off-street parking space to the rear of the property. It is expected that the remaining 12 off-street parking spaces on the property would be sufficient during construction. Temporary effects on property access and off-street parking during construction are expected to be very low.

Once the WRRE is completed, on-street parking fronting this property will be removed via No Stopping at All Time (NSAAT) line markings. Therefore, the proposed temporary drop-off will have no additional effects on on-street parking along William Roberts Road.

## 5.5.2 EB2 – William Roberts Road North

As stated in **Section 5.1.1.4**, the construction yard will be located on the south-western quadrant of the Pakuranga Road / William Roberts Road intersection. The properties at 169, 171, 173 Pakuranga Road and 3 William Roberts Road have been acquired by AT and will provide the necessary space for this CSA. Again, it should be noted that this CSA is subject to a separate resource consent application and associated transport assessment. As such, no further comment on the construction yard is provided in this ITA.

AT have also acquired the remaining properties on the western side of William Roberts Road north, including 5, 7, 9,11, 13, 15, 17 and 19 William Roberts Road. These properties will provide the necessary space for the northern RRF abutment. The removal of these residential properties will further reduce the need for on-street parking along William Roberts Road north.

Lastly, AT have also acquired the properties at 177, 179, 181, 187 Pakuranga Road and 2 William Roberts Road on the southern side of the carriageway to allow for the Pakuranga Road / RRF tie-in.

Accesses to the remaining properties on the eastern side of the road will be maintained as per the existing environment.

Overall, the need for on-street parking along William Roberts Road north will be significantly reduced during construction.  Therefore, the temporary effects to property access and parking are considered to be negligible.

### 5.5.3 EB2 – SEART

To enable the proposed design of the new SEART off-ramp and the southern RRF abutment, AT have acquired the following properties on the northern side of SEART:

- 25 and 27 Ti Rakau Drive
- 2, 4, 6, 8, 10, 12, 14, and 18 Seven Oaks Drive
- 1R and 19 Dale Crescent

The properties have been earmarked for demolition, thereby removing the current use of these properties.

### 5.5.4 EB2 – Pakuranga Road

In the existing environment, clearways are provided in the kerbside lanes on Pakuranga Road in the EB2 project area.  The westbound clearway is enforced during the AM peak period (07:00 – 09:00) and the eastbound clearway during the PM peak period (16:00 – 18:00).  In the off-peak periods, on-street parking is permitted along these sections of Pakuranga Road.  **Figure 83** shows the location and extent of the clearways (blue outline) along Pakuranga Road in the EB2 project area.

**Figure 83: Pakuranga Rd clearways and on-street parking (blue outline)**

During construction of the Pakuranga Road / RRF tie-in, these clearways and on-street parking sections will be removed to provide the necessary workspace. As Pakuranga Road is largely similar to Ti Rakau Drive in the EB3R project area, in terms of traffic volumes and operating speeds, it is not unreasonable to assume that Pakuranga Road experiences the same low level of parking utilisation in the existing environment during weekdays and weekends. Based on this assumption, the temporary effects on on-street parking are expected to be negligible.

As stated in **Section 4.2.1.6**, the initial stages of the Pakuranga Road construction will also include longitudinal and crossing drainage works. Only the longitudinal drainage works are assessed here for effects to property access. A full assessment of effects to general traffic is presented in **Section 5.2.2.6**.

#### *5.5.4.1 141 Pakuranga Road – GAS Service Station*

**Figure 84** shows the general location of the proposed longitudinal drainage works along Pakuranga Road and the property boundary of the GAS service station located at 141 Pakuranga Road.

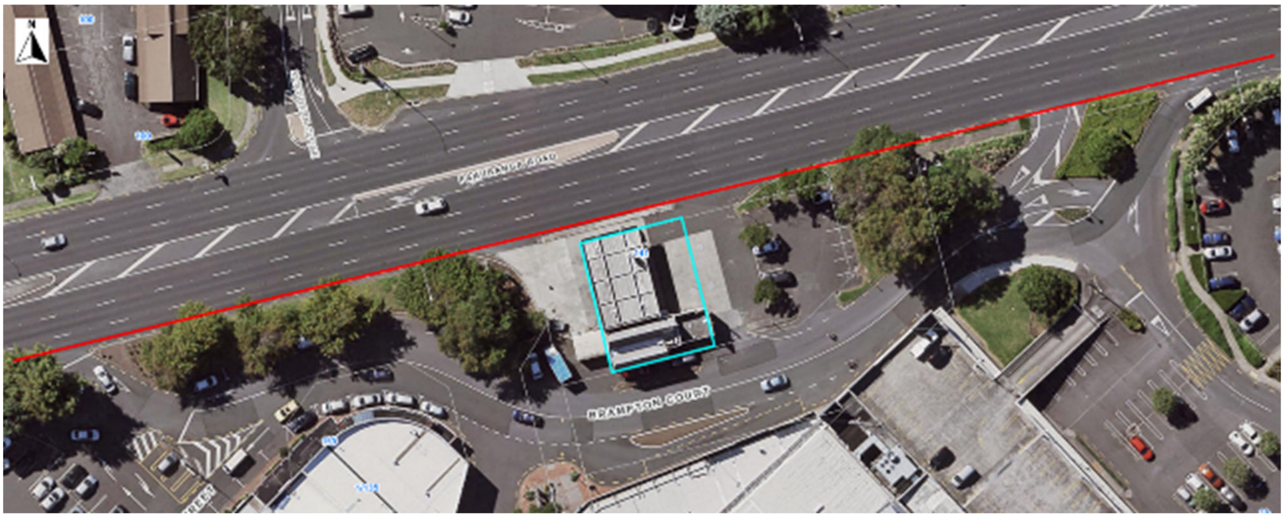



**Figure 84: Pakuranga Rd longitudinal drainage works and GAS service station (blue outline)**

Longitudinal drainage construction will consist of the temporary closure of a section of the westbound kerbside lane on Pakuranga Road between William Roberts Road and Ti Rakau Drive. During this phase of work, access to the Pakuranga Plaza via Brampton Court, access to the GAS service station and the Pepler Street exit will be maintained at all times via steel plating across the trench.

The drainage works will be completed in sections to ensure this. It is envisaged that lateral shifts of the access points may be required. The construction team will also liaise with the operators of the GAS service station to ensure sufficient access widths are provided, as and when required, for fuel delivery tankers. Therefore, the effects to property access are expected to be negligible.

### 5.5.5 EB2 – Ti Rakau Drive, Side Roads and Pakuranga Plaza

#### *5.5.5.1 Ti Rakau Drive*

Ti Rakau Drive in the EB2 project area, between Pakuranga Road and Reeves Road, provides no on-street parking in the existing environment. Therefore, the construction phase will have no effects on on-street parking.

As per the existing environment, left-in/left-out access to the residential properties on the western side of the carriageway will be maintained throughout the construction programme. These properties include 3-27 Ti Rakau Drive. This will be achieved through the CTMP. Once the works commence in the centre of the carriageway (Phase 2 of Ti Rakau Drive in EB2, see **Section 4.2.1.5**), residents of these properties will no longer be able to use the existing U-turn facility on Ti Rakau Drive to head east. However, vehicles will still be able to turn right into Pakuranga Road and Brampton Court to execute a U-turn manoeuvre if required to head east along Ti Rakau Drive. Therefore, the effects to these residential properties are considered to be very low.

Effects on property access with regards to the Pakuranga Plaza are discussed below.

#### *5.5.5.2 Side Roads*

Construction works on Palm Avenue will be limited to the approach of the intersection with Ti Rakau Drive. Works on Aylesbury Street will be more extensive; however, no on-street parking is provided in the existing environment and property access will be maintained during these works. Therefore, the construction phase will have no effects on on-street parking or property access along these side roads.

#### *5.5.5.3 Pakuranga Plaza*

The works in the EB2 project area around Pakuranga Plaza will be constantly evolving as works transition from one phase to the next. This in turn will require multiple changes to the accesses and parking currently serving the Pakuranga Plaza until the completion of the Project. The sections below provide an assessment of the temporary effects, in chronological order, to property access and parking.

It should be noted that for the purposes of this ITA, the term 'Pakuranga Plaza' is used here to refer to the entire area encompassed in the yellow outline in **Figure 85** below and includes the following properties:

- 7 and 10 Aylesbury Street
- 2R Ti Rakau Drive
- 1 Pepler Street
- 121, 123, 125, 127, 129, 131, 135, 141 and 167 Pakuranga Road

The assessment presented here excludes the property located at 26 Ti Rakau Drive (red outline).


**Figure 85: Pakuranga Plaza**

**Property Access:**

The Pakuranga Plaza currently has six access points allowing for both in and out movements, with a seventh allowing for movements out onto Pakuranga Road only. All accesses are currently priority-controlled. **Figure 86** below shows the traffic volumes for both the AM and PM peak hours at these access points (PM traffic volumes in brackets).


**Figure 86: Pakuranga Plaza access volumes**[33]

As stated in **Section 5.5.1.3**, Reeves Road will be closed during the initial stages of the construction programme, from June 2023 to April 2024[34]. Access to the Plaza via the private access road (Access 1), the undercover carpark (Access 2), and Aylesbury Street east (Access 3) will not be maintained.

[33] Traffic volumes sourced from the AIMSUN Do-Minimum model, with a 2028 horizon year.
[34] These periods are indicative, and the Alliance is reviewing the design and construction methodology to accelerate construction.

However, access will be maintained through the work site to The Warehouse's goods access and the Library service entrance. Furthermore, the existing secondary access to the undercover carpark off the private access road in the Pakuranga Plaza will remain open. The main access to the Library on Aylesbury Street east will also remain open.

It is expected that vehicles would divert to the four remaining accesses on Ti Rakau Drive and Pakuranga Road, which would have sufficient spare capacity due to the low background traffic volumes at those accesses. Therefore, the effects of the temporary closure of these accesses are expected to be very low.

Following this initial period, access to the Plaza via Access 2 and Access 3 will be reinstated (as stated in **Section 5.5.1.3**). However, Access 1 will remain closed. Background traffic volumes on Reeves Road will also be significantly reduced. Again, it is expected that vehicles would divert to the remaining accesses on Ti Rakau Drive, Pakuranga Road and the reopened accesses on Reeves Road, which would have sufficient spare capacity. The effects of the temporary closure of this access are expected to be negligible.

Thereafter, construction will commence on the new Ti Rakau Drive bus lanes between Pakuranga Road and Reeves Road as well as the new Ti Rakau Drive / Aylesbury Street / Palm Avenue crossroads intersection (Phase 1 of Ti Rakau Drive in EB2, see **Section 4.2.1.5**). During this phase of work the existing priority-controlled Aylesbury Street accesses (Access 6 and 7) will be maintained until completion of the new signalised crossroads intersection. Once completed, the accesses will be removed. An improved access will be provided with increased capacity and will allow for all movements in and out.

Construction of the traffic signals at the Reeves Road / Aylesbury Street intersection (Access 3) is anticipated to occur after the RRF construction. This will provide an improved access to the Plaza with increased capacity.

During the final stages of the programme, after the Reeves Road and RRF construction, longitudinal drainage works will commence on Pakuranga Road. However, as stated in **Section 5.5.4.1**, access to the Plaza via Brampton Court (Access 4) and the Pepler Street exit (Access 5) will be maintained at all times via steel plating across the trenches. The drainage works will be completed in sections to ensure this. It is envisaged that lateral shifts of the access points may be required. The temporary effects to property access are expected to be negligible.

**Parking:**

As stated in **Section 3.7.1**, the Pakuranga Plaza currently supports 1,355 parking spaces on site. The utilisation of 840 of these parks was captured during the parking survey, shown in **Figure 87**. The utilisation of the surveyed parking spaces was determined to not exceed 60% capacity on a typical weekday or weekend.

It is not unreasonable to assume that the remaining 495 un-surveyed parking spaces experience a similar utilisation profile. Therefore, based on this assumption, it is expected that the Pakuranga Plaza has at least 542 unoccupied parking spaces on an average weekday and weekend. It should be noted that AT owns all of parking areas shown in **Figure 87**, except for those parking spaces located on Aylesbury Street.

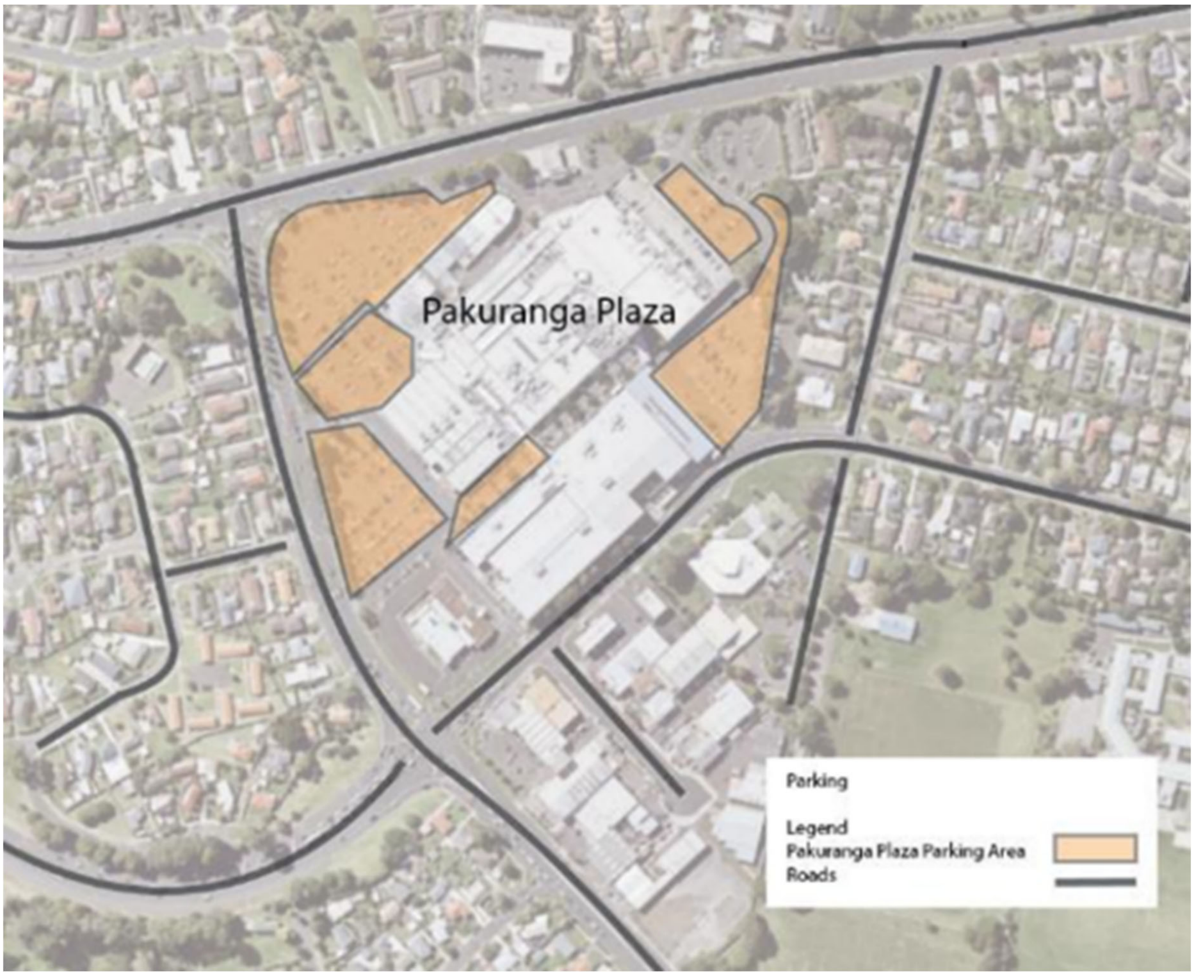



**Figure 87: Pakuranga Plaza surveyed parking areas**

As stated in **Section 5.1.1.3**, the parking area off Pennell Place in the Pakuranga Plaza will be temporarily occupied and established as a CSA. This carpark in its current form provides 108 parking spaces and will be occupied for approximately two years and two months. Taking the spare capacity of parking spaces at the Plaza into account, it is expected that there would still be 434 unoccupied parking spaces on site during the period where this parking area is occupied by the CSA. Therefore, in light of the existing spare capacity, the temporary effects of the use of the carpark as a CSA on parking at the Plaza are expected to be negligible.

During the Reeves Road closure and the RRF construction, works will commence on the new offline bus lanes on the northern side of Ti Rakau Drive between Pakuranga Road and Reeves Road. These works will also include the new bus station, the Ti Rakau Drive / Aylesbury Street / Palm Avenue crossroads intersection and the ‘Kiss-and-Ride’ facility (see **Section 4.2.1.5**). **Figure 88** shows the layout of the proposed works and the effects on parking at the Plaza.

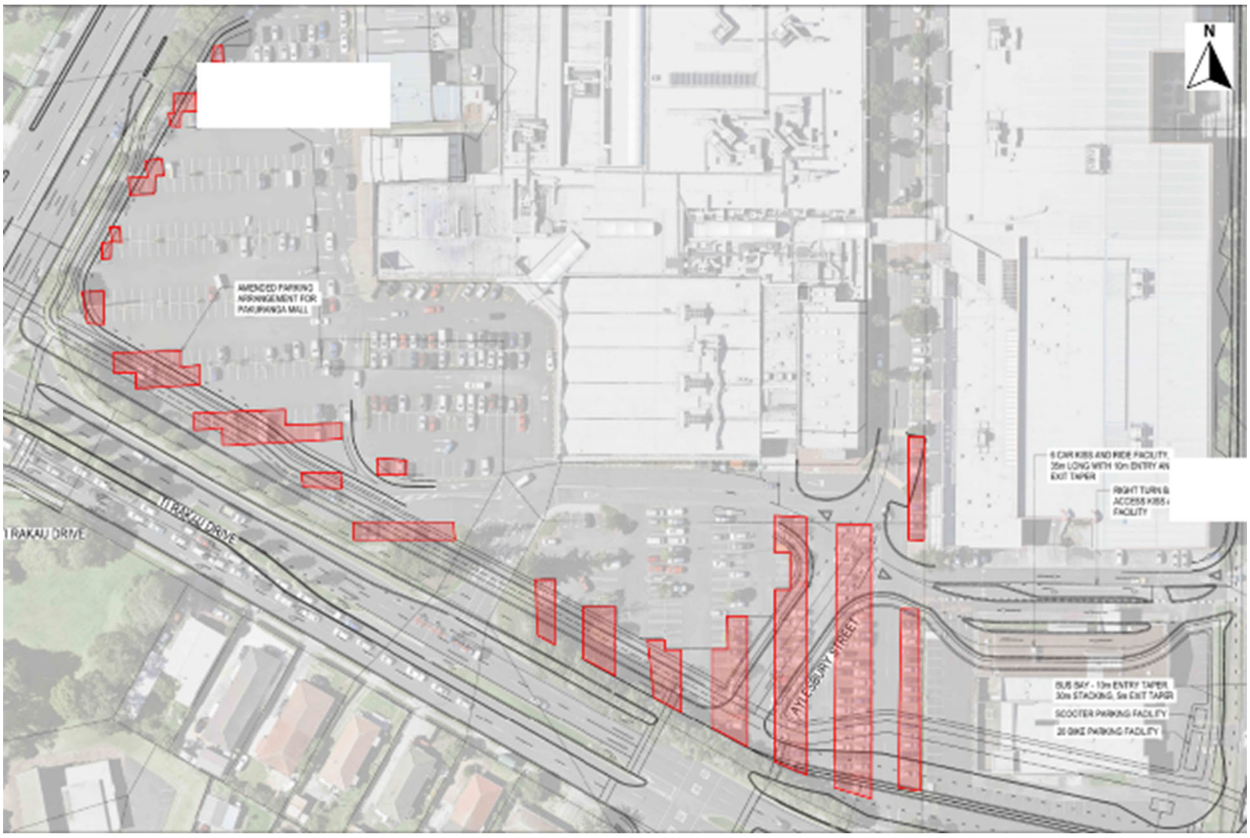



**Figure 88: EB2 Ti Rakau Drive effects on parking at Pakuranga Plaza**

For the purposes of this ITA it was assumed that all of the required land area will be under construction simultaneously, in other words the full effects of the proposed works on parking. Based on this assumption, the works will result in the permanent loss of 245 parking spaces at Pakuranga Plaza. Taking the spare capacity of parking at the Plaza into account, it is expected that there would still be 189 unoccupied parking spaces on site. Therefore, the effects of these works on parking at the Plaza are expected to be negligible.

Following construction of the RRF, late in the construction programme, the Reeves Road / Aylesbury Street and the Reeves Road / William Roberts Road intersections will be signalised. This will include the realignment of Reeves Road and Aylesbury Street east. **Figure 89** shows the proposed alignment of Reeves Road and Aylesbury Street east, as well as the effects on parking at the Plaza.

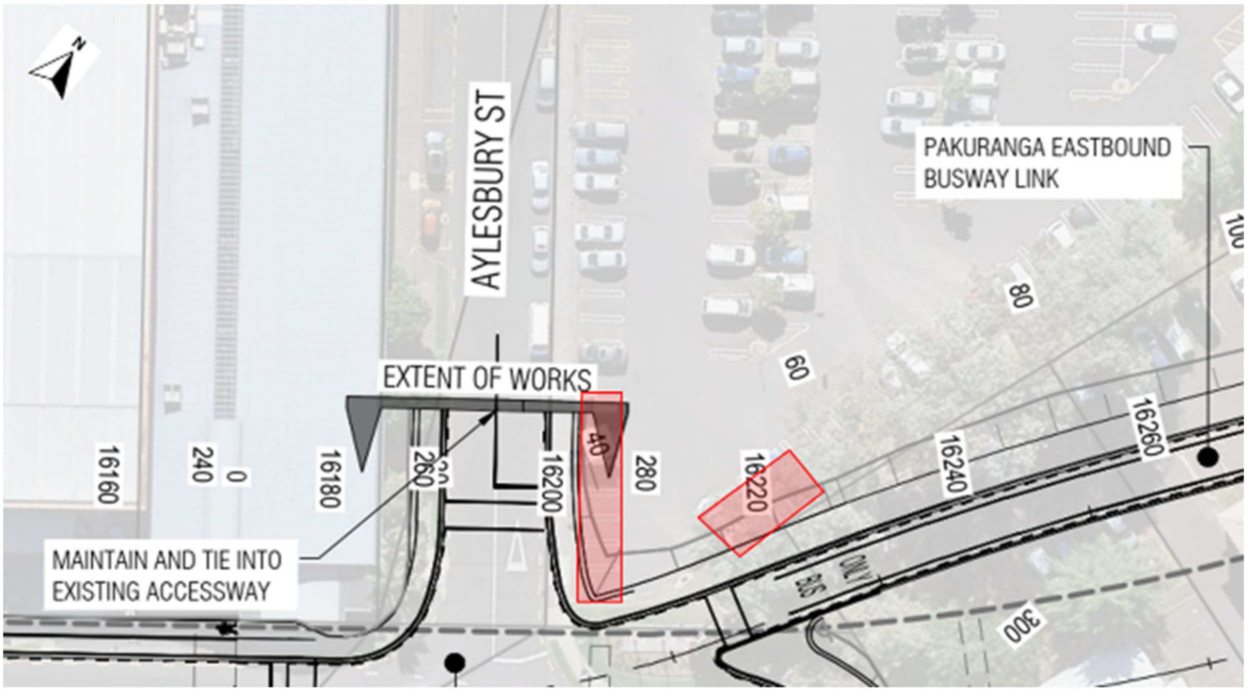



**Figure 89: Reeves Rd / Aylesbury St signalisation effects on parking at Pakuranga Plaza**

The proposed works will result in an additional and permanent loss of 12 parking spaces at the Pakuranga Plaza. However, these proposed works will occur after the CSA at Pennell Place has been disestablished and the parking area re-established. Taking the spare capacity of the remaining 297 parking spaces into account, it is expected that there would still be 285 unoccupied parking spaces on site. Therefore, the effects of this signalisation on parking at the Plaza are expected to be negligible.

### 5.5.6 EB3R – Ti Rakau Drive, Side Roads and Properties

The sections below provide assessment of the temporary effects during construction on property access and parking in the EB3R project area.

To enable the EB3R construction, AT have acquired the vast majority of properties along the southern frontage of Ti Rakau Drive including:

- 37 – 69, 73-105, 121-143, 147-207 Ti Rakau Drive
- 3 Tiraumea Drive
- 1, 3, 4 and 5 Mattson Road as well as small parcels of 7 and 9 Mattson Road
- 1 Roseburn Place
- 1 Snell Place
- 2 and 167 Edgewater Drive
- 1-2 Wheatley Avenue

Properties acquired on the northern side of the carriageway include:

- 216-222 Ti Rakau Drive
- 170, 174 and 178 Gossamer Drive
- A parcel of 168R Gossamer Drive

The majority of these properties are scheduled for demolition to facilitate the busway, thereby removing the current use of these properties.

#### *5.5.6.1 Ti Rakau Drive*

Ti Rakau Drive in the EB3R project area, between Reeves Road and Gossamer Drive, provides on-street parking along both sides for the majority of the corridor in the existing environment. The on-street parking will be removed during construction to provide the necessary space for the work zones. However, as stated in **Section 3.7.4**, the average utilization is poor with only 3% occupancy on weekdays and 8% on Saturdays. This is not unexpected as this high-volume road does not create an appealing location to park vehicles and is likely leading to a high perceived risk of crashes. It is also not unreasonable to assume that the surrounding residential properties have sufficient off-street parking.

Furthermore, the acquisition of the majority of the residential properties on the southern frontage of Ti Rakau Drive will remove the need for on-street parking along this section. Lastly, the current left-in/left-out access arrangements to the properties on the northern side of Ti Rakau Drive will be maintained during construction. Therefore, the temporary effects on on-street parking and property access along Ti Rakau Drive are considered to be negligible.

#### *5.5.6.2 Side Roads*

**Tiraumea Drive, Roseburn Place, Edgewater Drive and Wheatley Avenue:**

Construction works along the side roads of Tiraumea Drive, Roseburn Place, Edgewater Drive west, Wheatley Avenue and Edgewater Drive east will be limited to the approaches of the intersections with Ti Rakau Drive. Therefore, the construction phase will have negligible effects on on-street parking and property access along these side roads.

**Marriot Road and Chevis Place:**

No works are planned along Marriott Road and Chevis Place. Therefore, construction will have no temporary effects on on-street parking and property access along these side roads.

**Mattson Road:**

Construction works along Mattson Road will be relatively more extensive. The Mattson Road approach will be set back approximately 40 m south and 25 m east of its current location where it intersects with Ti Rakau Drive. This will provide space for the new westbound lanes on Ti Rakau Drive and will provide sufficient midblock stacking space between the intersections at Mattson Road and William Roberts Road.

However, the properties on the southern side of Ti Rakau Drive have been acquired, removing the need for on-street parking. Accesses to properties along Mattson Road not acquired by AT will be maintained and will interface with the new alignment of Mattson Road similar to the existing environment. Therefore, the temporary effects on on-street parking and property access along Mattson Road are considered to be negligible.

**Gossamer Drive:**

The Gossamer Drive approach limit line will be set back approximately 15 m from its current location and the kerbside exit lane will be extended to 100 m. NSAAT line markings are currently provided on the eastern side of the road up to the bus stop near the intersection with Riverhills Avenue. These markings will be replicated on the western side of the road. This will result in the loss of on-street parking in front of 169, 171, 173 and 175 Gossamer Drive. It is likely that these properties have sufficient off-street parking, and that on-street parking is not occupied on a regular basis. Accesses to properties along Gossamer Drive not acquired by AT will be maintained and will interface with the roadway similar to the existing environment. Therefore, the effects on on-street parking and property access along Gossamer Drive are considered to be negligible.

**Freemantle Place:**

The Freemantle Place approach will be set back approximately 11 m. NSAAT line markings are provided on the western side of the road for approximately 31 m from the limit line. The line markings will be reinstated upon completion and will result in the loss of one parking space in front of 3 Freemantle Place. It is expected that the remaining on-street parking space in front of the property will be sufficient. The existing line markings on the eastern side of the road will be retained. Property access along Freemantle Place will be maintained as per the existing environment. Therefore, the effects on on-street parking and property access along Freemantle Place are considered to be negligible.

### *5.5.6.3 Residential Properties on Southern Frontage of Ti Rakau Drive*

During Phase 1 of EB3R, there will be 10 long driveways or 'strip accessways' to residential properties not being acquired by AT on the southern side of Ti Rakau Drive. As the new westbound lanes are constructed, access via Ti Rakau Drive will not be possible. Access to these properties will be provided via temporary residential access tracks along the back of the acquired properties as mitigation.

The temporary access tracks will run alongside a haul road to be used by site traffic, meaning construction and residential traffic will be separated. The tracks will be constructed with Chip Seal as the surface and in cases where the access tracks are greater than 50 m in length, these tracks will be wide enough for two-way traffic flow. The effect on each individual property is assessed below, however, overall the effects to property access are considered to be very low or negligible. As stated in **Section 4.2.2.3**, Phase 1 of EB3R is anticipated to have a duration of approximately one year and three months.

**75A Ti Rakau Drive:**

A temporary access point will be provided for 75A Ti Rakau Drive on the eastern side of Roseburn Place. The driveway will effectively line up with the existing access of 73 Ti Rakau Drive and will be separated from the haul road. Therefore, the effects to property access are considered to be negligible. **Figure 90** shows the location of the proposed temporary access.

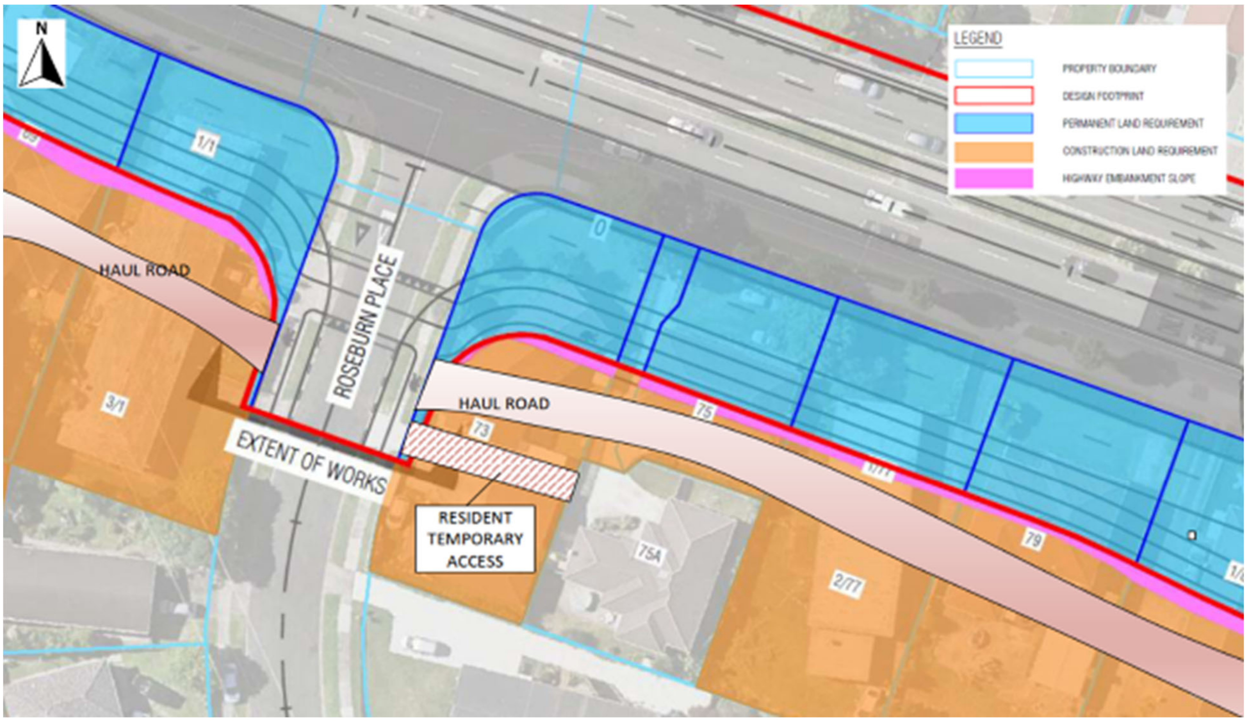



**Figure 90: 75A Ti Rakau Dr temporary access**

**83, 83A-C, 87, 89, 91, 97 and 103A Ti Rakau Drive:**

A temporary access road will be provided for 83, 83A-C, 87, 89, 91 and 97 Ti Rakau Drive at the back of the acquired properties. The temporary access road will head east towards Edgewater Drive. **Figure 91** shows the location of the proposed temporary access road.

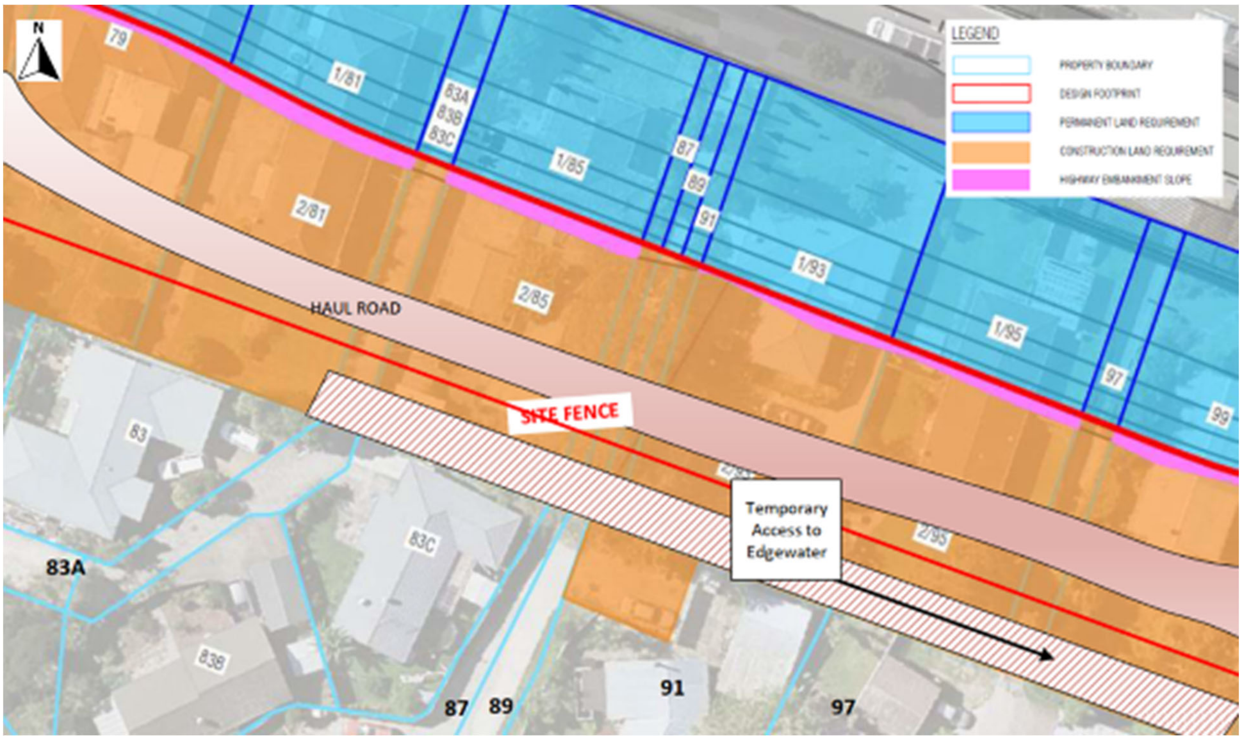



**Figure 91: 83, 83A-C, 87, 89, 91 and 97 Ti Rakau Dr temporary access road**

At the eastern end, the proposed temporary access road will terminate in the temporary parking area to be provided for the Edgewater Shops, located at 105 Ti Rakau Drive. A temporary access point for 103A Ti Rakau will also be provided here. **Figure 92** below shows the location of the proposed temporary accesses.

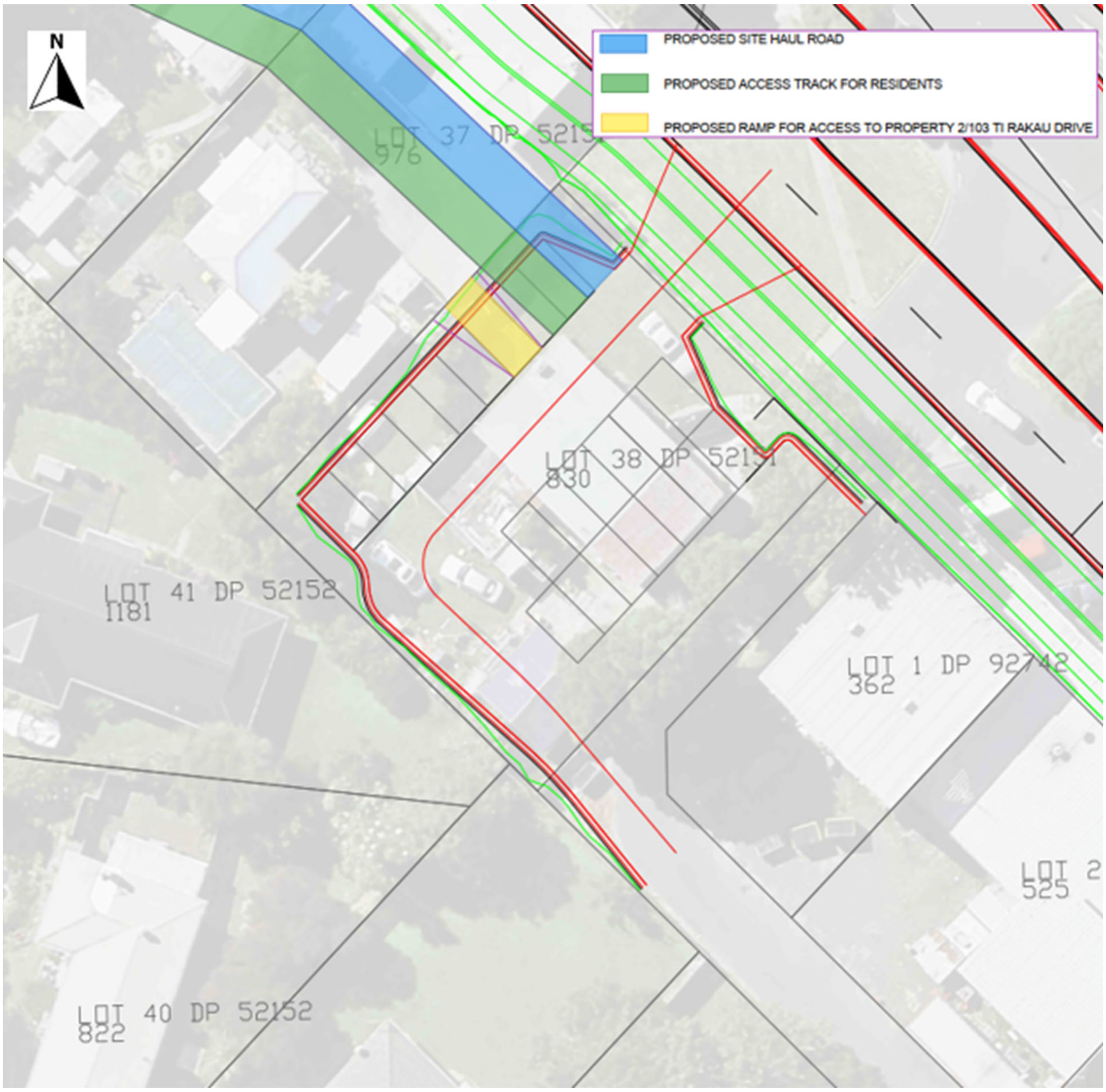



**Figure 92: 103A Ti Rakau Dr temporary access**

Residents will access the temporary access roads via Edgewater Drive west and the access road to the rear of the Edgewater Shops. The site haul road will also intersect the temporary parking area, but will be accessed by site traffic via Ti Rakau Drive. Therefore, the temporary effects to property access are considered to be very low.

**129 Ti Rakau Drive:**

A temporary access point will be provided for 129 Ti Rakau Drive on the western side of Wheatley Avenue. The driveway will intersect with Wheatley Avenue close to the existing access of 1 Wheatley Avenue and will be separated from the haul road. Therefore, the effects to property access are considered to be negligible. **Figure 93** shows the location of the proposed temporary access.

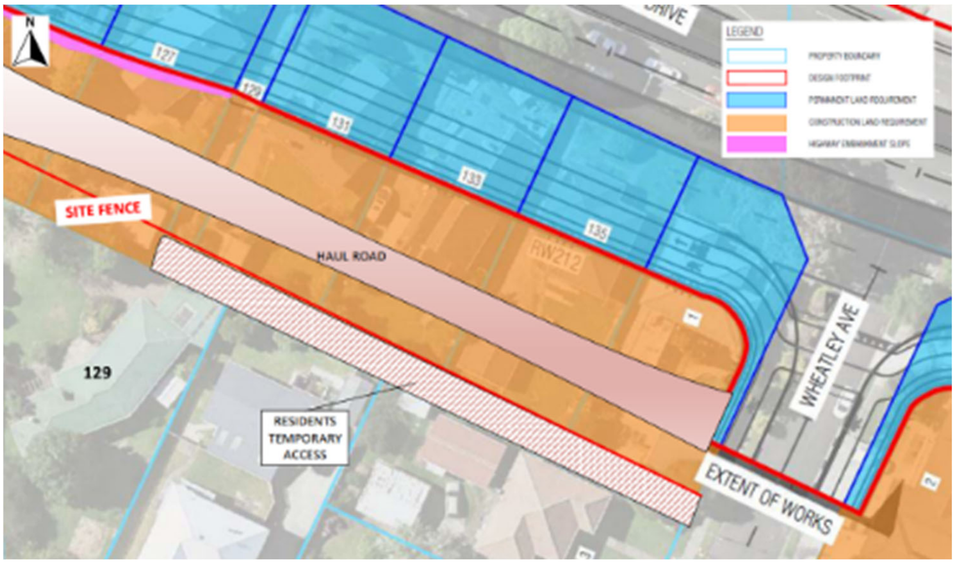



**Figure 93: 129 Ti Rakau Dr temporary access**

**145 Ti Rakau Drive:**

A temporary access point will be provided for 145 Ti Rakau Drive on the western side of Edgewater Drive east. The access road will intersect with Edgewater Drive at the existing access of 149 Ti Rakau Drive. A haul road is not proposed between Wheatley Avenue and Edgewater Drive east. Therefore, the effects to property access are considered to be negligible. **Figure 94** below shows the location of the proposed temporary access.

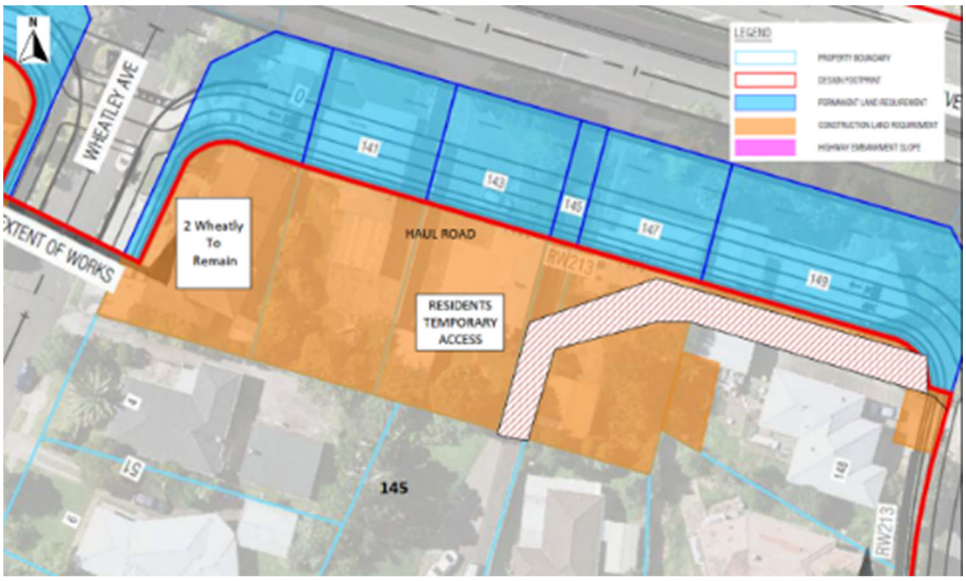



**Figure 94: 145 Ti Rakau Dr temporary access**

**175A, 177, 183, 185 and 191 Ti Rakau Drive:**

A temporary access road will be provided for 175A, 177, 183 and 185 Ti Rakau Drive at the back of the acquired properties. The temporary access road will head east towards Freemantle Place. **Figure 95** shows the location of the proposed temporary access road.

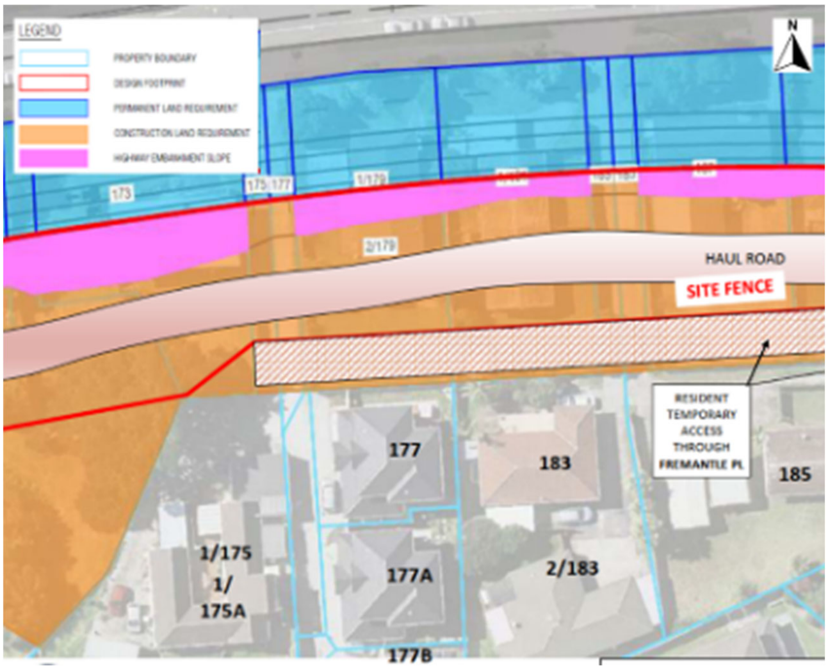



**Figure 95: 175, 177, 183 and 185 Ti Rakau Dr temporary access**

Near the eastern edge of 185 Ti Rakau Drive, the proposed haul road and temporary access road will curve northward, which will allow for access to also be provided to 191 Ti Rakau Drive. The temporary access road will continue eastwards and intersect Freemantle Place at the existing access to 201 Freemantle Place. Therefore, the effects to property access are considered to be negligible. **Figure 96** shows the location of the proposed temporary access road.


**Figure 96: 191 Ti Rakau Dr temporary access**

#### 5.5.6.4 107 and 109 Ti Rakau Drive – Edgewater Shops

The Edgewater Shops, located at 107 and 109 Ti Rakau Drive, is a block of local shops. The parking area currently provides 26 parking spaces on the northern side of the property and an additional four parking spaces on the eastern side, for a total of 30 parking spaces (see **Figure 97**). It should be noted that these parking spaces are within the road reserve.


**Figure 97: Edgewater Shops parking area**

During construction, the new westbound lanes on Ti Rakau Drive as well as the redesigned Edgewater Drive west approach will result in the loss of all of the parking spaces at the shops.

As stated in **Section 5.5.6.3** above, the property at 105 Ti Rakau Drive (immediately west of the Edgewater Shops) has been acquired by AT and will provide a temporary parking area for customers of the shops (see **Figure 98**).


**Figure 98: Edgewater Shops temporary parking area during construction**

As stated in **Section 3.7.5**, utilization of the existing carpark is not expected to exceed 60% or 18 occupied spaces during a typical weekday or weekend. The temporary carpark will provide 18 parking spaces and access to the parking area will be from Edgewater Drive west via the access road at the back of the commercial properties. Access to the refuse collection area to the rear of the property will be maintained. Temporary signage will be provided to direct customers to the temporary parking area during construction. Therefore, temporary effects to property access and parking at the Edgewater Shops are considered to be very low.

As stated in **Section 5.5.6.3**, the temporary site haul road (blue polygon) will intersect the temporary carpark, but will be accessed by site traffic from Ti Rakau Drive. The proposed temporary access roads to 83, 83A-C, 87, 89, 91, 97 Ti Rakau Drive (green polygon) and 103A Ti Rakau Drive (yellow polygon) will also intersect the temporary carpark and will be accessed via Edgewater Drive west.

#### 5.5.6.5 32 Edgewater Drive – Edgewater College

As stated in **Section 4.2.2.3**, Phase 1 of Ti Rakau Drive in EB3R will include the construction of the Edgewater Drive east and west intersections. This will require the closure of one intersection while diverting all traffic along Edgewater Drive to the other in an alternating fashion.

Edgewater College is located near the Ti Rakau Drive / Edgewater Drive west intersection. In the existing environment, the S013 school bus service proceeds down Edgewater Drive east and the S073 proceeds down Edgewater Drive west. The closure of either Edgewater Drive east or west intersections would have an effect on this arrangement.

In the existing environment school buses are unable to perform a U-turn from the current bus stop facility. Two mitigation measures are proposed to be consulted on with the Ministry of Education and the school itself, these being the temporary rearrangement of the current off-street parking area and utilising the existing bus stops on Ti Rakau Drive. From a transport perspective, either option would be manageable.

**Parking Area Rearrangement:**

A temporary rearrangement of the off-street parking area will allow for the buses to enter the parking area from both the south and the north, drop off students and then perform a U-turn to proceed back to whichever intersection on Edgewater Drive is open.

**Figure 99** shows the vehicle tracking curves of school buses approaching the parking area from both directions on Edgewater Drive. This option could result in the temporary loss of 19 parking spaces in the off-street parking area for approximately two weeks (a one-week closure of each intersection).

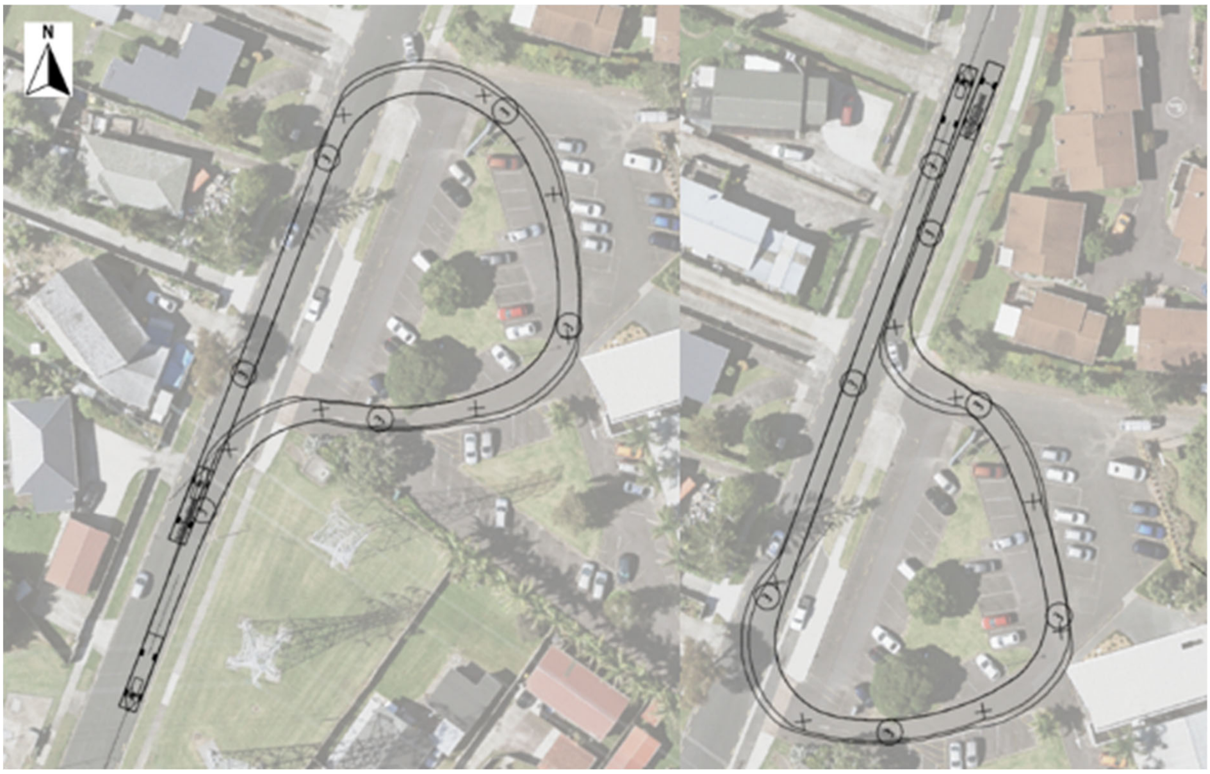



**Figure 99: Edgewater College parking area U-turn**

**Utilizing Ti Rakau Drive Bus Stops:**

An alternative could be to utilise the existing bus stops on Ti Rakau Drive, ID 6131 and 6136 near the Ti Rakau Drive / Edgewater Drive west intersection. This will require students to walk from these bus stops to the school, which is a travel distance of approximately 460m and travel time of just over five minutes.

#### *5.5.6.6 207, 219 and 229 Ti Rakau Drive – Pakuranga Baptist Church*

**Figure 100** shows the location of the Pakuranga Counselling Centre located at 207 Ti Rakau Drive (blue outline. The figure also shows the location of the Pakuranga Chinese Baptist Church, Pakuranga Baptist Kindergarten and the Pakuranga Baptist Church located at 219 Ti Rakau Drive (yellow outline) and the Congregational Church of Samoa located at 229 Ti Rakau Drive (purple outline). Lastly, the figure also shows the areas that will be occupied temporarily for drainage works (orange polygons), and the indicative drainage works segments (red outline).

It should be noted there is no intention to occupy the building at 207 Ti Rakau Drive and no demolition is planned.

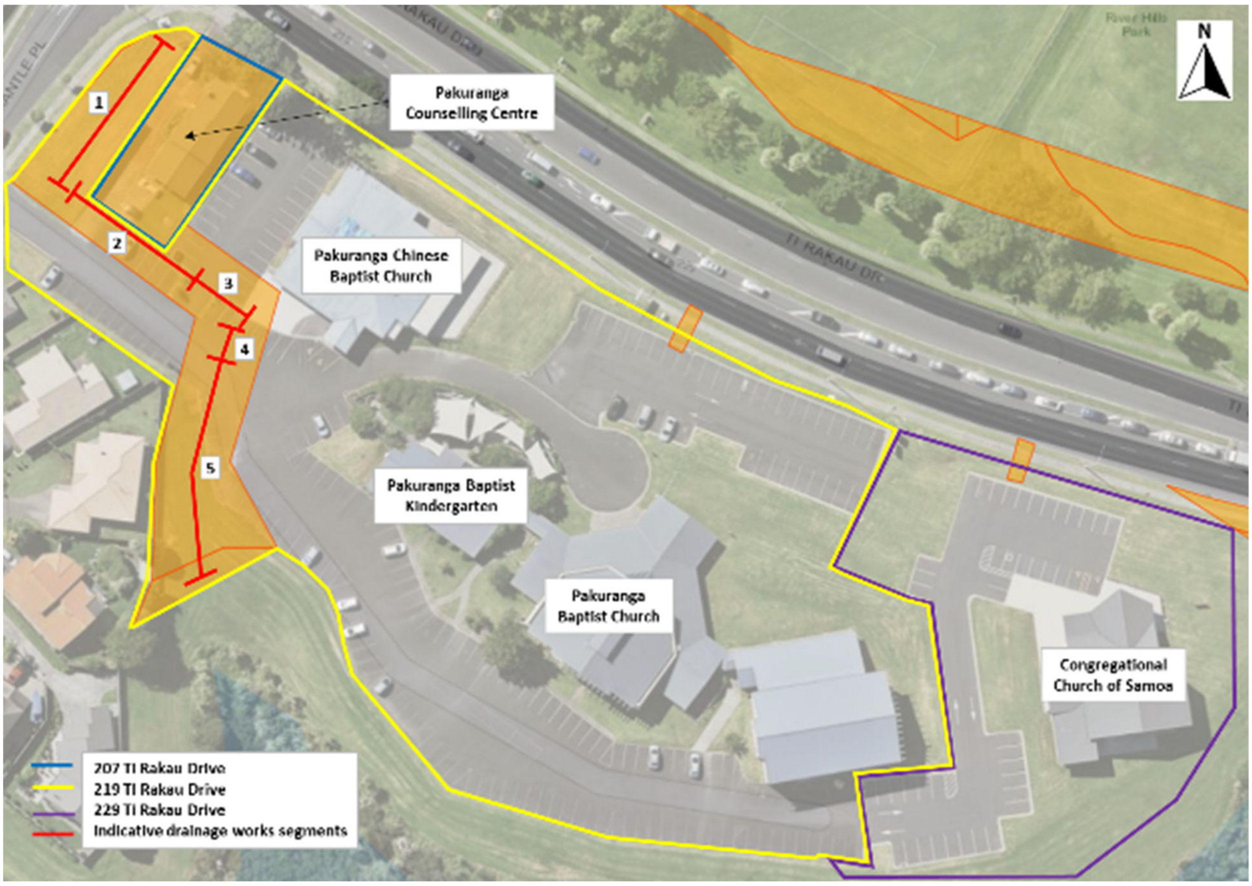



**Figure 100: 207, 219 and 229 Ti Rakau Dr drainage works**

Drainage works will be undertaken on these properties over a period of approximately one month. It is envisaged that the works will be completed in sections to maintain vehicle access to all the properties at all times. Furthermore, the drainage works will be undertaken during weekdays, with the possibility of works being undertaken on Saturdays as well.

At the end of each work week, the work zone will be reduced in size, while maintaining the safety of the work zone, to free up as many occupied parking spaces as possible. The Pakuranga Chinese Baptist Church currently offer one Saturday evening service, one Sunday morning service and one Sunday evening service. The Pakuranga Baptist Church currently offer one Sunday morning service.

**Property Access:**

In the existing environment, the Pakuranga Counselling Centre has one access off Ti Rakau Drive and one access off the private internal road to the off-street parking on the property. At least one of these accesses will be maintained at all times. Pedestrian access will be maintained at all times, and CTMPs will be employed to ensure this. Therefore, temporary effects to property access at 207 Ti Rakau Drive are considered negligible.

To avoid lateral shifts of the access and loss of parking as a result, the internal access to the Pakuranga Chinese Baptist Church will be reduced to a one-way system for a short period and will be managed through the CTMP. Appropriate liaison and advanced notice will be provided of the planned works.

Two-way access will be maintained for circulation on the internal roads of the property at 219 Ti Rakau Drive by using steel plating across trenches where necessary. Therefore, the temporary effects to property access at 207, 219 and 229 Ti Rakau Drive are considered to be very low.

**Parking:**

In the existing environment, the Counselling Centre at 207 Ti Rakau Drive has five parking spaces on site. The proposed drainage works will not have any effect on these parking spaces.

In the existing environment, 219 Ti Rakau Drive has a total of 220 parking spaces on site. The proposed drainage works in front of the Pakuranga Chinese Baptist Church are expected to affect 19 of these parking spaces. However, as stated above, the planned works will be staggered and is not expected to result in the loss of more than 10 parking spaces at any one time. Each segment of works will require roughly one week to complete.

To maintain two-way circulation on the internal roads, parking spaces will be removed temporarily. The planned works will result in the temporary loss of 15 parking spaces on the southern side of 219 Ti Rakau Drive during the work week. However, as stated above, the work zone size will be reduced at the end of the work week to free up as many parking spaces as possible. Therefore, it is expected that the temporary effects on parking will be very low.

##### *5.5.6.7 168R Gossamer Drive – River Hills Park*

A parcel of land along the southern boundary of 168R Ti Rakau Drive River Hills Park has been acquired by AT to allow for the eastbound Gossamer Drive bus station. Discussions are ongoing with the River Hills Park as well as the Fencibles United Football Club on the rearrangement of the fields on the property as a result of the Project.

However, from a transport perspective, the Project will have no temporary effects to property access and parking on-site.

### 5.5.7 Summary of Temporary Effects to Property Access and Parking

Overall, the temporary effects during construction on property access and parking will be mitigated appropriately and are considered to be negligible or very low. Where existing vehicle access arrangements and parking provisions cannot be maintained, appropriate mitigation measures have been proposed to provide levels of access and parking commensurate with the existing environment as far as is reasonably practicable.

Engagement with property owners or operators will be undertaken during construction to communicate the planned works and duration, the potential disruption and proposed mitigation measures as well as to develop additional measures or improve upon proposed measures if required. This will be a requirement of the CTMP.

Lastly, pedestrian access to properties will be maintained at all times. This will be ensured through the CTMPs.

## 5.6 Effects to Safety Performance

Safety measures will be in place during construction, ensured by the CTMPs. The safety and protection of the public, traffic and construction team is paramount, and all site operations will be focused on zero harm to all involved, associated and traveling through the project areas. This will be achieved through the following:

- Traffic management that separates the public / traffic operations as well as managing and maintaining public and traffic flow entering and exiting the construction operations within the project areas.

- Active communications with the local community and public travelling through the construction work zones to ensure they will be regularly updated on temporary traffic management operations.

- Before each work zone is ready to be opened following construction, an independent safety audit will be completed, and public notifications of the opening and new layouts will be made available.

## 5.7 Construction Traffic Management Plan

Construction Traffic Management Plans (CTMPs) will be employed for both EB2 and EB3R. The purpose of the CTMPs will be to avoid, remedy or mitigate the adverse effects of construction of the Project on transport, parking and property access so far as is reasonably practicable. The CTMPs will be developed in accordance with the conditions of the Notice of Requirement (NoR) / resource consent associated with the Project and will include management methods, controls and reporting to manage the potential effects on transport, parking and property access associated with the Project.

The CTMPs will be informed by practical experience with traffic management during construction and will reflect best practice through drawing on:

- The Code of Practice for Temporary Traffic Management prepared by the New Zealand Transport Agency, 4th Edition 2018 (CoPTTM)
- NZ Guide to Temporary Traffic Management (NZGTTM) which is currently in pre-consultation draft and will supersede the CoPTTM in due course

The CTMPs will set out the traffic management strategies that will be employed to manage the temporary effects during construction, including, but not limited to:

- Design standards
- Hours of operation
- Public transport
- Property access and parking
- Pedestrian and cyclists
- Emergency services
- Impacts on heavy haulage
- Impacts on taxi users
- Construction access and laydown
- Staff parking
- Site offices and satellite compounds
- Construction vehicle movements
- Transport network management
- Communicating traffic management impacts
- Temporary traffic management auditing
- Monitoring and reporting

# 6 Assessment of Permanent Effects upon Completion

The sections below provide an assessment of the permanent effects of EB2 and EB3R including:

- Future transport network
- General traffic effects
- Effects to bus services and facilities
- Effects to pedestrians and cyclists
- Effects to property access and parking
- Effects to safety performance

## 6.1 Project Benefits

In order to provide context to the benefits of the EB2 and EB3R sections of the Project and to reaffirm the benefits of the Project as a whole, the main elements of **Section 1.1.3** are reiterated here. Once delivered, the Project (EB2, 3 and 4) will provide:

- Better connections and sustainable travel options for pedestrians, cyclists, motorists, bus and train customers
- A reliable 40-minute bus and train trip between Botany Town Centre and Britomart (saving 20-minutes)
- Increase in public transport trips from 3,700 to 18,000 per day by 2028
- Increase in public transport mode share from 7% to 25% by 2028
- Reduce carbon emissions by 9,292 kg per day by 2028
- 24,000 more people with access to a rapid transit bus station within 1 km from home
- 5 km of busway between Pakuranga and Botany fully separated from other traffic
- 5 new bus stations with quality facilities
- 12 km of safe and separated walking and cycling infrastructure
- Reeves Road flyover to reduce vehicle congestion around Pakuranga Town Centre
- Encourage and support development of a more sustainable urban form and improve urban amenity
- Accommodates electric buses, a key part of AT's low-emission vehicle fleet by 2040

Although EB2 and EB3R are only two components of the Project as a whole, these sections will nevertheless provide:

- Significantly improved travel options for all modes of transport
- Increased public transport patronage and mode share through increased catchment and dedicated bus lanes
- Reduced carbon emissions
- Improved walking and cycling amenity and safety through dedicated infrastructure
- Reduced congestion, particularly around the Pakuranga Town Centre, through the new Reeves Road flyover

## 6.2 Future Transport Network

As stated in **Section 3.3**, a full RASF assessment was completed for the Project[35] and the section below summarises the key aspects of the future transport network and modal priority in the EB2 and EB3R project areas. Again, the RASF provides a systematic and consistent methodology for identifying the Place and Movement functions of roads and streets. In so doing, it reflects the needs and catchment of the adjoining land use as well as the movement of people, goods and services. Refer to **Figure 4** in **Section 3.3** which shows the RASF typology matrix, which is a function of Movement and Place significance.

In the future, the primary function of the Ti Rakau Drive and Pakuranga Road corridors will remain as Movement, but with more strategic functions. The Pakuranga Town Centre Masterplan promotes mixed-use retail zones along Ti Rakau Drive between Pakuranga Road and William Roberts Road. The primary function of the RRF will be Movement between Pakuranga Road and SEART. The proposed Eastern Busway bus stations will also attract more people within the area as the activities served by these bus stations will become local attractions.

**Figure 101** outlines the future typology of the EB2 area.

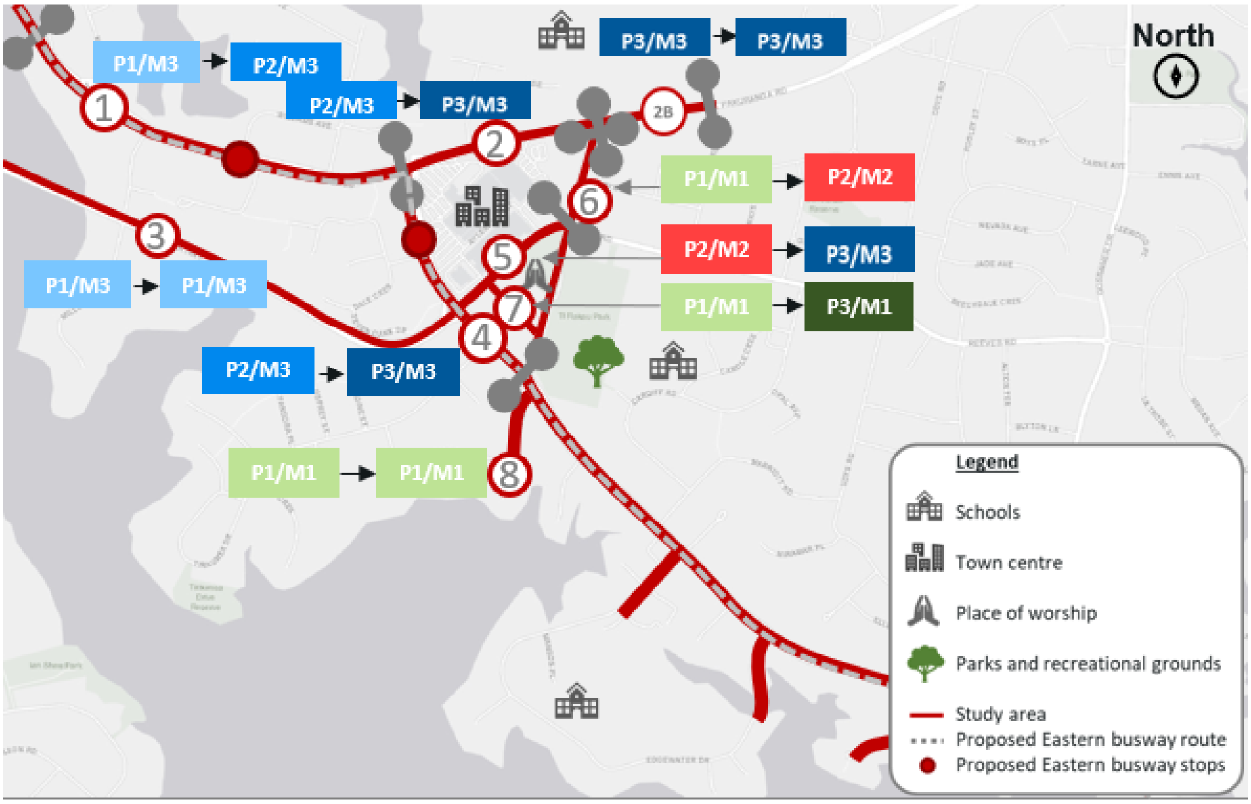



**Figure 101: EB2 future typology**

**Figure 102** below outlines the future model priorities of the EB2 area.

[35] EB234-1-TE-RP-Z0-A2-Roads and Street Framework

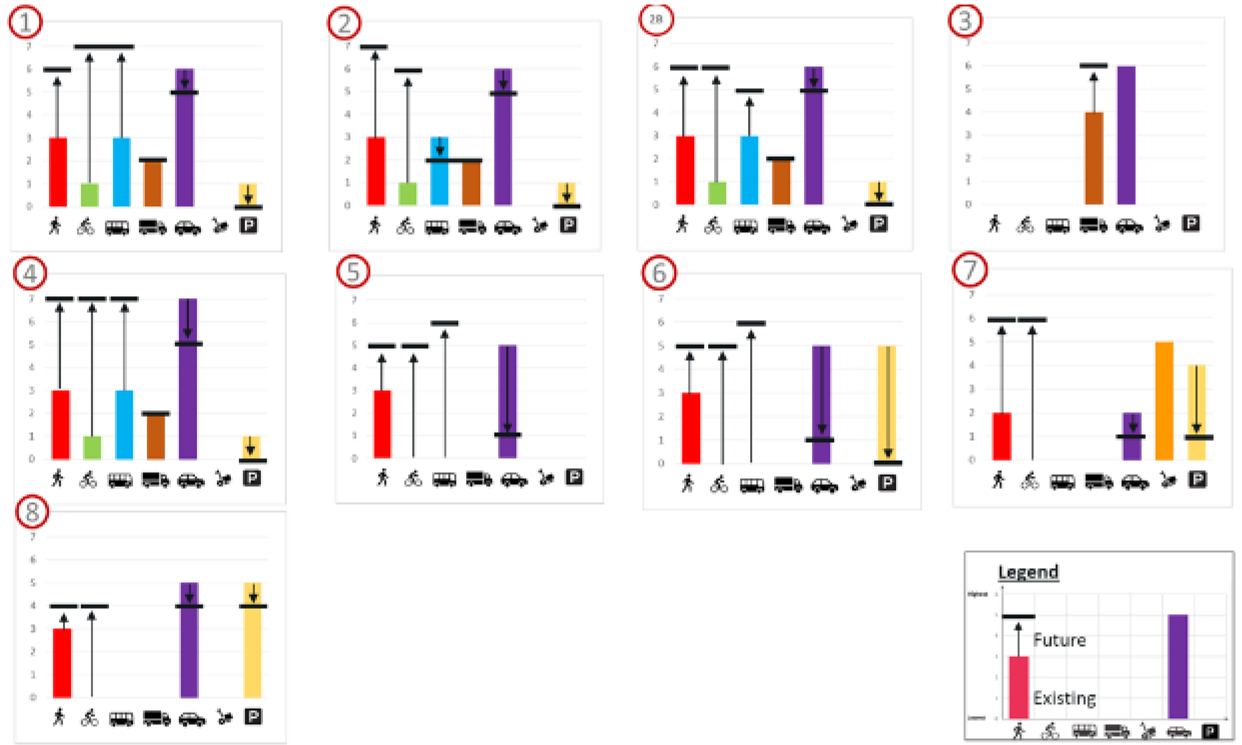



**Figure 102: EB2 future modal priorities**

While the corridors of Pakuranga Road and Ti Rakau Drive will carry more movements in future, Place function around the proposed bus stations in EB2 will become more important as these will attract more people.  For this reason, the future Place typologies around the bus stations are marked as P2' as the stations will become more accessible with increased catchment and footfall.

The RRF will accommodate traffic from SEART and will largely prioritise active modes and public transport movements on the ground level.  Reeves Road and William Roberts Road, which are currently town centre adjacent streets, will also be better integrated with the wider Town Centre.  As a result, Place function on these streets will increase to 'P3'.

A general trend of improved pedestrian, cycling and bus modal priority is observed throughout the EB2 project area, as shown in **Figure 102**.  As a result, the modal priority of general traffic as well as parking will decrease.

**Figure 103** below outlines the future typology of the EB3R area.


**Figure 103: EB3R future typology**

Similar to EB2, the Place function around the proposed bus stations in EB3R are also marked as ‘P2’ (compared to the existing ‘P1’) as the stations will become more accessible, have increased catchments and higher footfall. The Movement and Place functions of the surrounding side roads will remain as per the existing environment.

**Figure 104** outlines the future modal priorities of the EB3R area.


**Figure 104: EB3R future modal priorities**

Again, the modal priority of pedestrians, cyclists and buses will be improved throughout the EB3R project area, with a resultant decrease in modal priority of general traffic and parking.

## 6.3 General Traffic Effects

The sections below provide an assessment of permanent effects to general traffic upon completion of EB2 and EB3R. As stated in **Section 5.2.2**, general traffic effects refer to the movement of traffic across the road network as a whole. Similar to the assessments of the traffic environment during construction, the AIMSUN and SIDRA traffic modelling assessments were undertaken as per the methodology set out in **Section 2.4**.

### 6.3.1 Traffic Volumes

**Table 36** outlines the expected AM and PM peak hour traffic volumes of the Do-Minimum and EB2/EB3R scenarios upon completion along key sections of the network, with a 2028 horizon year.

**Table 36: Do-Minimum and EB2/EB3R (post construction) traffic volumes (2028)**

| Location | Direction | AM Peak | | PM Peak | |
|---|---|---|---|---|---|
| | | Do-Minimum [veh/h] | EB2/EB3R [veh/h] | Do-Minimum [veh/h] | EB2/EB3R [veh/h] |
| Pakuranga Rd (West of the RRF)[36] | Westbound | 2,552 | 964 | 1,429 | 960 |
| | Eastbound | 1,100 | 848 | 2,702 | 977 |
| Pakuranga Rd (East of the RRF)[37] | Westbound | 2,687 | 3,041 | 1,427 | 1,992 |
| | Eastbound | 1,102 | 1,448 | 2,767 | 2,461 |
| William Roberts Rd (Ti Rakau Dr – Reeves Rd)[38] | Northbound | 39 | 445 | 46 | 567 |
| | Southbound | 31 | 332 | 70 | 372 |
| Reeves Rd (West of William Roberts Rd) | Westbound | 519 | 133 | 396 | 49 |
| | Eastbound | 231 | 107 | 762 | 283 |
| Reeves Rd (East of William Roberts Rd) | Westbound | 478 | 411 | 193 | 149 |
| | Eastbound | 241 | 393 | 550 | 633 |
| RRF | Northbound | - | 931 | - | 1,638 |
| | Southbound | - | 2,445 | - | 1,141 |
| SEART (West of ramps) | Westbound | 3,387 | 3,352 | 1,740 | 2,072 |
| | Eastbound | 1,133 | 1,830 | 3,054 | 2,915 |
| Ti Rakau Dr (Pakuranga Rd – Reeves Rd) | Westbound | 1,097 | 1,200 | 2,129 | 584 |
| | Eastbound | 1,387 | 754 | 1,003 | 848 |
| Ti Rakau Dr (Reeves Rd – William Roberts Rd) | Westbound | 2,270 | 1,779 | 1,635 | 1,407 |
| | Eastbound | 711 | 1,320 | 1,433 | 1,605 |
| Ti Rakau Dr (William Roberts Rd – Edgewater Dr west) | Westbound | 2,167 | 1,609 | 1,635 | 1,455 |
| | Eastbound | 741 | 1,133 | 1,433 | 1,454 |
| Ti Rakau Dr (Edgewater Dr west – Gossamer Dr) | Westbound | 1,828 | 1,544 | 1,665 | 1,588 |
| | Eastbound | 852 | 1,062 | 1,159 | 1,401 |

[36] Relates to the section of Pakuranga Road west of William Roberts Road in the Do-Minimum scenario.
[37] The section of Pakuranga Road east of William Roberts Road in the Do-Minimum scenario.
[38] The section of William Roberts Road south of Reeves Road, prior to the completion of the extension, in the Do-Minimum scenario.

| Location | Direction | AM Peak | | PM Peak | |
|---|---|---|---|---|---|
| | | Do-Minimum [veh/h] | EB2/EB3R [veh/h] | Do-Minimum [veh/h] | EB2/EB3R [veh/h] |
| Gossamer Dr (At Ti Rakau Drive) | Northbound | 282 | 423 | 678 | 701 |
| | Southbound | 1,153 | 758 | 516 | 394 |

A benefit of the RRF upon completion will be that less traffic is expected to travel on Pakuranga Road west, between Ti Rakau Drive and the RRF, as this is treated as the minor movement at the intersection. Instead, this traffic will travel along the RRF directly towards SEART. This trend is expected to occur in both the AM and PM peaks. Conversely, more traffic is expected to travel on Pakuranga Road east, to and from Howick, as this is treated as the major movement at the intersection.

The RRF is expected to experience somewhat cyclical traffic volumes with the majority of traffic heading southbound during the AM peak and returning northbound during the PM peak. A further benefit of the RRF is that Ti Rakau Drive in EB2, between Pakuranga Road and Reeves Road, is also expected to experience less traffic volumes in both directions during the AM and PM peaks.

Ti Rakau Drive in EB3R, from Reeves Road to Gossamer Drive, is predicted to experience decreased traffic volumes in the westbound direction only and increased traffic volumes in the eastbound direction during both the AM and PM peaks. This is likely due to the increased capacity of the SEART off-ramp as a result of the additional right-turn lane.

As expected with the completion of the William Roberts Road extension, more traffic is predicted to travel along William Roberts Road between Ti Rakau Drive and Reeves Road in both directions during the AM and PM peaks.

Since general traffic will not be able to access Reeves Road from Ti Rakau Drive in the future and with the William Roberts Road link completed, traffic volumes are expected to be lower on Reeves Road west between William Roberts Road and Cortina Place. This section of Reeves Road will provide access to the Pakuranga Plaza. Reeves Road east, from William Roberts Road towards Pakuranga Heights, is expected to carry roughly the same traffic volumes westbound and higher traffic volumes eastbound in the future.

SEART is also expected to experience cyclical traffic volumes (similar to the existing environment), with the majority of traffic heading westbound during the AM peak and returning eastbound during the PM peak.

Gossamer Drive is expected to experience lower traffic volumes in the southbound direction during both AM and PM peaks. This is likely due to the removal of the left-turn slip lane on the northern approach at the intersection. However, Gossamer Drive is expected to experience marginally higher traffic volumes in the northbound direction. This is likely due to the increased length of the northbound kerbside exit lane.

### 6.3.2 Intersection Performance upon Completion

Intersection performance analyses of the transport network comprised of selected intersections in the EB2 and EB3R project areas was undertaken using SIDRA. Again, the analyses consisted of a comparison between the Do-Minimum and EB2/EB3R scenarios, with a 2028 horizon year, for both the AM and PM peak hours. The performance criteria for the assessment were based on the Level of Service (LOS), degree of Saturation (DOS) or v/c ratio and delay in seconds.

Permanent effects upon completion of EB2 and EB3R were assessed in a final scenario. The EB2/EB3R Final scenario simulates the completion of all EB2 works (see **Section 4.2.1**) and all EB3R works (see **Section 4.2.2**).

The AM peak hour for intersections assessed in the EB2/EB3R Final scenario was between 08:00 – 09:00 and the PM peak hour was between 16:30 – 17:30. Traffic signal phasing diagrams per intersection are provided in **Appendix J** and lane performance summaries per intersection are provided in **Appendix K**.

Intersection performance analyses were undertaken at the following intersections:

- Pakuranga Road / Ti Rakau Drive
- Pakuranga Road / Brampton Court
- Pakuranga Road / RRF
- Reeves Road / Aylesbury Street
- William Roberts Road / Reeves Road
- William Roberts Road / Cortina Place
- Ti Rakau Drive / Aylesbury Street / Palm Avenue
- Ti Rakau Drive / Reeves Road / SEART
- Ti Rakau Drive / William Roberts Road
- Ti Rakau Drive / Mattson Road
- Ti Rakau Drive western U-turn facility
- Ti Rakau Drive eastern U-turn facility
- Ti Rakau Drive / Gossamer Drive

**Table 37** below provides a comparison of the intersection performance between the Do-Minimum and EB2/EB3R Final scenarios during the AM peak, with a 2028 horizon year.

**Table 37: Intersection performance – Do-Minimum vs EB2/EB3R Final (AM peak, 2028)**

| Intersection | Do-Minimum | | | EB2/EB3R Final | | |
|---|---|---|---|---|---|---|
| | **LOS** | **DOS (v/c)** | **Delay [s]** | **LOS** | **DOS (v/c)** | **Delay [s]** |
| Pakuranga Rd / Ti Rakau Dr | C | 0.85 | 33 | D | 0.81 | 41 |
| Pakuranga Rd / Brampton Ct | N/A | 0.42 | 1 | N/A | 0.53 | 1 |
| Pakuranga Rd / RRF | Built during EB2 | | | F | 1.14 | 87 |
| Reeves Rd / Aylesbury St | N/A | 0.27 | 1 | C | 0.60 | 34 |
| William Roberts Rd / Reeves Rd | N/A | 0.68 | 7 | E | 0.95 | 68 |
| William Roberts Rd / Cortina Pl | Built during WRRE | | | N/A | 0.27 | 2 |
| Ti Rakau Dr / Aylesbury St / Palm Ave | Built during EB2 | | | E | 0.92 | 60 |
| Ti Rakau Dr/ Reeves Rd / SEART | F | 0.90 | 178 | E | 1.02 | 66 |
| Ti Rakau Dr / William Roberts Rd | Built during WRRE | | | B | 0.91 | 17 |

| Intersection | Do-Minimum | | | EB2/EB3R Final | | |
|---|---|---|---|---|---|---|
| | **LOS** | **DOS (v/c)** | **Delay [s]** | **LOS** | **DOS (v/c)** | **Delay [s]** |
| Ti Rakau Dr / Mattson Rd | B | 0.79 | 16 | C | 0.90 | 29 |
| Ti Rakau Dr western U-turn facility | Built during EB3R | | | A | 0.75 | 5 |
| Ti Rakau Dr eastern U-turn facility | Built during EB3R | | | A | 0.77 | 7 |
| Ti Rakau Dr / Gossamer Dr | D | 1.02 | 48 | E | 0.98 | 80 |

SIDRA analysis indicates that, overall, in the AM peak the EB2/EB3R Final scenario is expected to result in minimal adverse effects on intersection performance along the network.

Minor increases in delay are expected at the Pakuranga Road / Ti Rakau Drive intersection, however the intersection is still expected to operate at an acceptable LOS D.

Compared to the Do-Minimum scenario, similar intersection performance is expected at the Pakuranga Road / Brampton Court intersection during the AM peak.

The Pakuranga Road / RRF intersection is expected to operate at LOS F during the AM peak under the EB2/EB3R Final scenario. The failing movement is the right-turn on the eastern Pakuranga Road approach, which is treated as the minor movement at the intersection. Travel time of the Howick to Pakuranga route is however predicted to experience only a marginal increase of 1 min in the AM peak period (see **Section 6.3.3**).

The trade-off of decreased general traffic performance in the right-turn lane is that buses are expected to operate at LOS C as a result of having higher priority, and the major movement from Howick towards SEART is expected to experience significant travel time improvements (see **Section 6.3.3**). Furthermore, the RRF is expected to relieve congestion around the Ti Rakau Drive / Reeves Road / SEART intersection by improving intersection performance and improving travel times from Botany to Pakuranga and SEART.

The performance of the Pakuranga Road / RRF intersection is a balance between competing priorities of bus, general traffic and freight, and pedestrians in a very congested network and constrained corridor. The only alternatives to improving LOS would be to provide additional lanes which would significantly increase the cost and footprint of the Project. Different intersection layouts, phasing and cycle times have been investigated to balance the competing modes. The intersection DOS < 1.2 is within the Transport Minimum Requirements (TMRs) for the overall intersection performance guiding the design of the Project.

The signalisation of the Reeves Road / Aylesbury Street and William Roberts Road / Reeves Road intersections is expected to result in acceptable levels of service and midblock queues blocking the bus lanes are predicted to be unlikely.

Once constructed, the following new intersections are expected to operate with spare capacity during the AM peak under the EB2/EB3R Final scenario, all with acceptable LOS and DOS:

- William Roberts Road / Cortina Place
- Ti Rakau Drive / Aylesbury Street / Palm Avenue
- Ti Rakau Drive / William Roberts Road
- Ti Rakau Drive western U-turn facility
- Ti Rakau Drive eastern U-turn facility

Improved intersection performance is expected at the Ti Rakau Drive / Reeves Road / SEART intersection under the EB2/EB3R Final scenario during the AM peak. The intersection is predicted to operate at an acceptable LOS E.

Minor increases in DOS and delay are also predicted at the Ti Rakau Drive / Mattson Road intersection, however the intersection is still expected to operate with spare capacity (LOS C).

The Ti Rakau Drive / Gossamer Drive intersection is expected to operate near capacity. The failing movements are the left-turn on the southern Freemantle Place approach, one right-turn lane on the eastern Ti Rakau Drive approach and the Gossamer Drive approach. Again, the trade-off is that all bus movements are expected to operate at LOS C and significant travel time improvements are predicted for the Botany to Pakuranga and SEART routes (see **Section 6.3.3**).

As above, the performance of this intersection is a balance between all the competing modes in a constrained corridor. The only alternative to improve LOS would be to provide additional lanes. Different intersection layouts, phasing and cycle times have been investigated and assessed to balance the competing modes. The intersection DOS < 1.2 is within the TMRs for the overall intersection performance guiding the design of the Project.

Lastly, it should be noted that the proposed design of the Ti Rakau Drive / Gossamer Drive intersection under this assessment (EB2/EB3R only), is not identical to the proposed design of the intersection under the full Project (EB2, 3 and 4). Under the full Project, the intersection would have a more efficient geometric layout, and as a result would also have a more efficient traffic signal phasing.

Overall, the proposed design of EB2/EB3R is expected to lead to improved operations and reduced congestion for general traffic across the network, and importantly, bus movements are predicted to operate at LOS C and with spare capacity. Furthermore, despite the poor performance at some of the intersections, significant improvements in travel time are expected overall. Lastly, further improvements are expected to be achieved once the full Project (EB2, 3, and 4) has been implemented.

**Table 38** below provides a comparison of the intersection performance between the Do-Minimum and EB2/EB3R Final scenarios during the PM peak, with a 2028 horizon year.

**Table 38: Intersection performance – Do-Minimum vs EB2/EB3R Final (PM Peak, 2028)**

| Intersection | Do-Minimum | | | EB2/EB3R Final | | |
|---|---|---|---|---|---|---|
| | **LOS** | **DOS (v/c)** | **Delay [s]** | **LOS** | **DOS (v/c)** | **Delay [s]** |
| Pakuranga Rd / Ti Rakau Dr | D | 0.91 | 47 | D | 0.82 | 41 |
| Pakuranga Rd / Brampton Ct | N/A | 0.53 | 1 | N/A | 0.33 | 1 |
| Pakuranga Rd / RRF | Built during EB2 | | | E | 1.08 | 75 |
| Reeves Rd / Aylesbury St | N/A | 0.38 | 1 | D | 0.75 | 45 |
| William Roberts Rd / Reeves Rd | N/A | 0.87 | 11 | D | 0.81 | 43 |
| William Roberts Rd / Cortina Pl | Built during WRRE | | | N/A | 0.31 | 2 |
| Ti Rakau Dr / Aylesbury St / Palm Ave | Built during EB2 | | | E | 0.88 | 63 |
| Ti Rakau Dr/ Reeves Rd / SEART | F | 1.13 | 83 | D | 0.92 | 45 |
| Ti Rakau Dr / William Roberts Rd | Built during WRRE | | | D | 1.10 | 36 |
| Ti Rakau Dr / Mattson Rd | B | 0.66 | 12 | C | 0.95 | 29 |
| Ti Rakau Dr western U-turn facility | Built during EB3R | | | A | 0.69 | 4 |
| Ti Rakau Dr eastern U-turn facility | Built during EB3R | | | A | 0.78 | 7 |
| Ti Rakau Dr / Gossamer Dr | D | 0.90 | 44 | F | 1.21 | 112 |

SIDRA analysis indicates that in the PM peak the EB2/EB3R Final scenario is expected to result in minimal adverse effects on intersection performance at the majority of intersections along the network.

Minor improvements in DOS and delay are expected at the Pakuranga Road / Ti Rakau Drive intersection, and the intersection is expected to operate at an acceptable LOS D.

Compared to the Do-Minimum scenario, similar intersection performance is expected at the Pakuranga Road / Brampton Court intersection during PM peak.

Once constructed, the following new intersections are expected to operate with spare capacity during the PM peak under the EB2/EB3R Final Scenario, all with acceptable LOS and DOS:

- Pakuranga Road / RRF
- William Roberts Road / Cortina Place
- Ti Rakau Drive / Aylesbury Street / Palm Avenue
- Ti Rakau Drive / William Roberts Road
- Ti Rakau Drive western U-turn facility
- Ti Rakau Drive eastern U-turn facility

Similar to the AM peak hour, the signalisation of the Reeves Road / Aylesbury Street and William Roberts Road / Reeves Road intersections is expected to result in acceptable levels of service during the PM peak hour. Midblock queues blocking the bus lanes are predicted to be unlikely.

Improved intersection performance is expected at the Ti Rakau Drive / Reeves Road / SEART intersection under the EB2/EB3R Final Scenario in the PM peak. The intersection is predicted to operate at an acceptable LOS D.

Minor increases in DOS and delay are also predicted at the Ti Rakau Drive / Mattson Road intersection, however the intersection is still expected to operate with spare capacity (LOS C).

The Ti Rakau Drive / Gossamer Drive intersection is expected to operate at LOS F during the PM peak. The failing movements are the through lanes on the western Ti Rakau Drive approach, the right-turn lanes on the eastern Ti Rakau Drive approach, the shared through and right-turn lane on the Gossamer Drive approach and the Freemantle Place approach. Similar to the AM peak hour, the trade-off is that all bus movements are expected to operate at LOS C and significant travel time improvements are predicted for the Pakuranga and SEART to Botany routes (see **Section 6.3.3**).

As discussed above, the performance of the intersection is a balance between all the competing modes in a constrained corridor. The only alternative to improve LOS would be to provide additional lanes. Different intersection layouts, phasing and cycle times have been investigated to balance the competing modes. Also, the proposed design of the Ti Rakau Drive / Gossamer Drive intersection under this assessment (EB2/EB3R only), is different to the proposed design of the intersection under the full Project (EB2, 3 and 4). Under the full Project, the intersection would have a more efficient geometric layout and traffic signal phasing.

Again, the proposed design of EB2/EB3R is expected to lead to overall improved operations for general traffic across the network, and importantly, bus movements are predicted to operate at LOS C and with spare capacity. Furthermore, despite the poor performance at some of the intersections, significant improvements in travel time are expected overall as a result of EB2 and EB3R, and will further improve once the full Project has been implemented.

### 6.3.3 General Traffic Travel Times

Route travel times were determined using the AIMSUN model, with a 2028 horizon year. The same four routes presented in **Section 5.2.3** are assessed here for permanent effects to general traffic travel times in the EB2/EB3R Final Scenario.

**Table 39** provides a comparison of the route travel times between the Do-Minimum and EB2/EB3R Final scenarios, with a 2028 horizon year.

**Table 39: General traffic travel times – Do-Minimum vs EB2/EB3R Final (2028)**

| AM Peak | | | | | | |
|---|---|---|---|---|---|---|
| Route | Westbound | | | Eastbound | | |
| | Do Minimum [min] | EB2/EB3R Final [min] | Difference [min] | Do Minimum [min] | EB2/EB3R Final [min] | Difference [min] |
| Botany - Pakuranga | 24.7 | 15.1 | -9.6 | 13.9 | 19.3 | 5.4 |
| Botany - SEART | 20.9 | 14.9 | -6.0 | 13.7 | 18.6 | 4.9 |
| Howick - Pakuranga | 5.3 | 6.3 | 1.0 | 4.7 | 6.6 | 1.9 |
| Howick - SEART | 11.6 | 5.7 | -5.9 | 8.0 | 6.4 | -1.6 |
| **PM Peak** | | | | | | |
| Route | Westbound | | | Eastbound | | |
| | Do Minimum [min] | EB2/EB3R Final [min] | Difference [min] | Do Minimum [min] | EB2/EB3R Final [min] | Difference [min] |
| Botany - Pakuranga | 18.4 | 17.9 | 0.1 | 24.6 | 17.0 | -9.9 |
| Botany - SEART | 11.6 | 10.0 | -1.1 | 24.5 | 19.4 | -6.2 |
| Howick - Pakuranga | 4.7 | 4.7 | 0.4 | 3.4 | 4.7 | 1.4 |
| Howick - SEART | 5.0 | 2.9 | -2.0 | 7.5 | 10.3 | 2.7 |

During the AM peak period, westbound (citybound) movements are prioritised along the transport network upon completion of EB2 and EB3R. Along with the completion of the RRF, this is predicted to lead to significant improvements in travel times from Botany to SEART and Pakuranga as well as from Howick to SEART. The route from Howick to Pakuranga is predicted to experience a negligible increase, as it is treated as a minor movement at the Pakuranga Road / RRF intersection. The prioritisation of westbound movements is however predicted to lead to manageable increases in travel times of some of the eastbound routes.

Similarly, in the PM peak eastbound movements are prioritised. This is predicted to lead to significant improvements in travel times from Pakuranga and SEART towards Botany. The eastbound routes from Pakuranga and SEART towards Howick are predicted to experience negligible increases in travel time. Westbound routes are predicted to experience small improvements, or in some cases negligible increases in travel time during the PM peak period upon completion of EB2 and EB3R.

## 6.4 Effects to Bus Services and Facilities

The sections below provide details and assessment of the permanent effects upon completion to bus services and facilities in the EB2 and EB3R project areas. **Figure 105** shows the existing bus services operating through project areas. These include the 70, 72C, 72M, 72X, 352, 711 and 712 services.

As noted above, school bus service operating in the EB2 and EB3R project areas include the following:

- S415 – Pakuranga to Sacred Heart College
- S416 – Botany Downs to Sacred Heart College
- S440 – Bucklands Beach to Sancta Maria College
- S013 – Otara to Edgewater College
- S073 – Otahuhu to Edgewater College

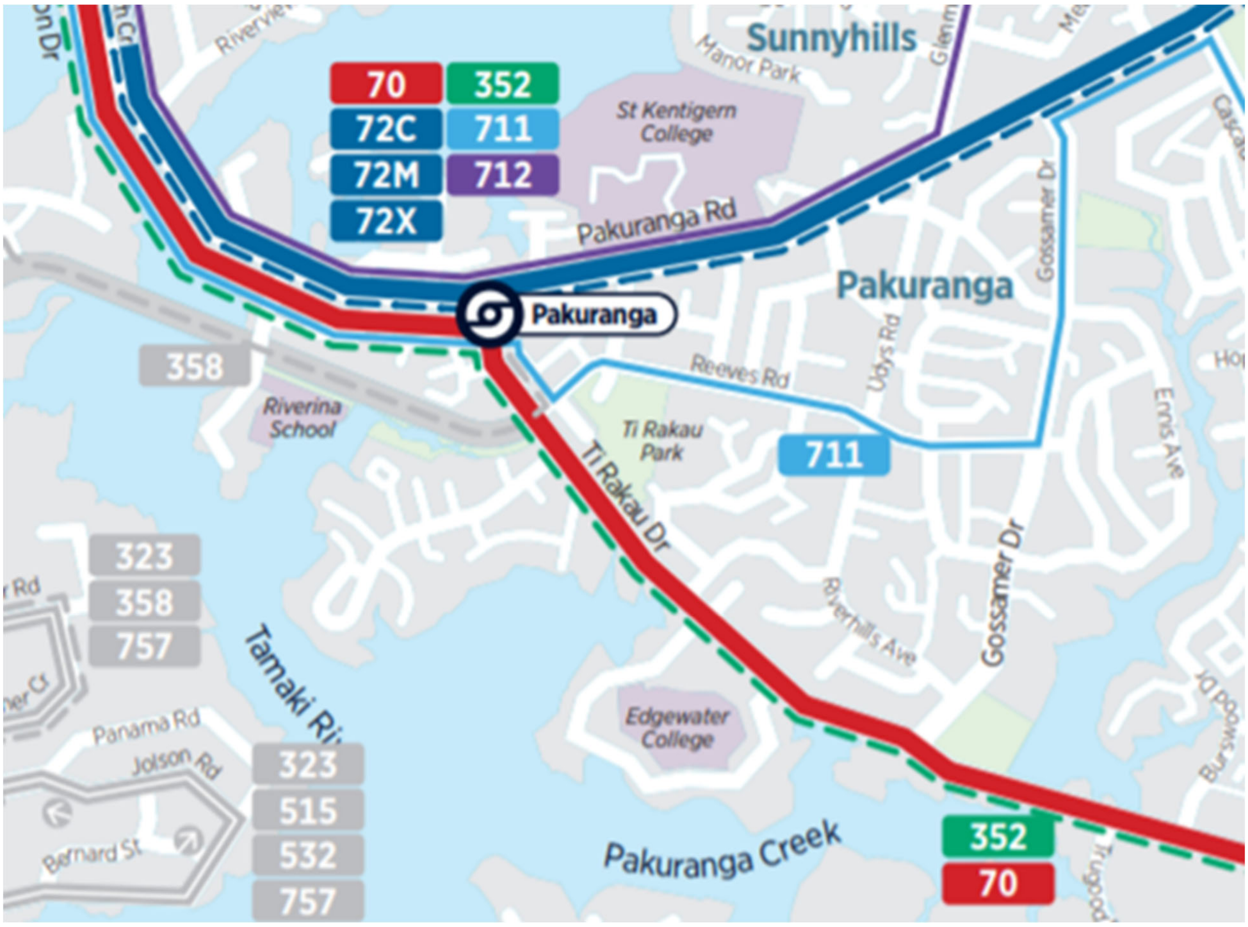



Figure 105: Existing bus services in the EB2 and EB3R project areas

### 6.4.1 Bus Station Overview

The sections below provide an overview of the bus stations that will be provided upon completion of EB2 and EB3R.

The benefits of the new stations will be the ability to support significantly higher public transport patronage through increased catchment and higher service frequencies through increased capacity. These benefits, in combination with improved customer accessibility, amenity and safety, will lead to an increase in mode share of public transport. A particular benefit of the Pakuranga Town Centre bus station will be the integration of all bus services in the EB2 and EB3R project areas, which will provide an improved transfer experience for passengers. Another benefit of the stations will be improved safety for buses.

#### *6.4.1.1 Pakuranga Town Centre*

A major interchange station will be provided in the Pakuranga Town Centre, on the northern side of Ti Rakau Drive, between Aylesbury Street and Reeves Road. The bus station will provide seating and sheltered cover for passengers boarding and alighting here. Furthermore, real-time information on service's estimated arrival times will be displayed on variable message boards along the platforms. Bicycle, scooter and e-bike storage will also be provided at this station. The bus station will be accessible to pedestrians and cyclists from all directions along all of the surrounding roads via separated footpaths, cycleways and signalised crossings. General vehicle access will be provided through a Kiss-and-Ride facility providing six drop-off spaces. **Figure 106** shows the layout of the proposed bus station in the Pakuranga Town Centre.

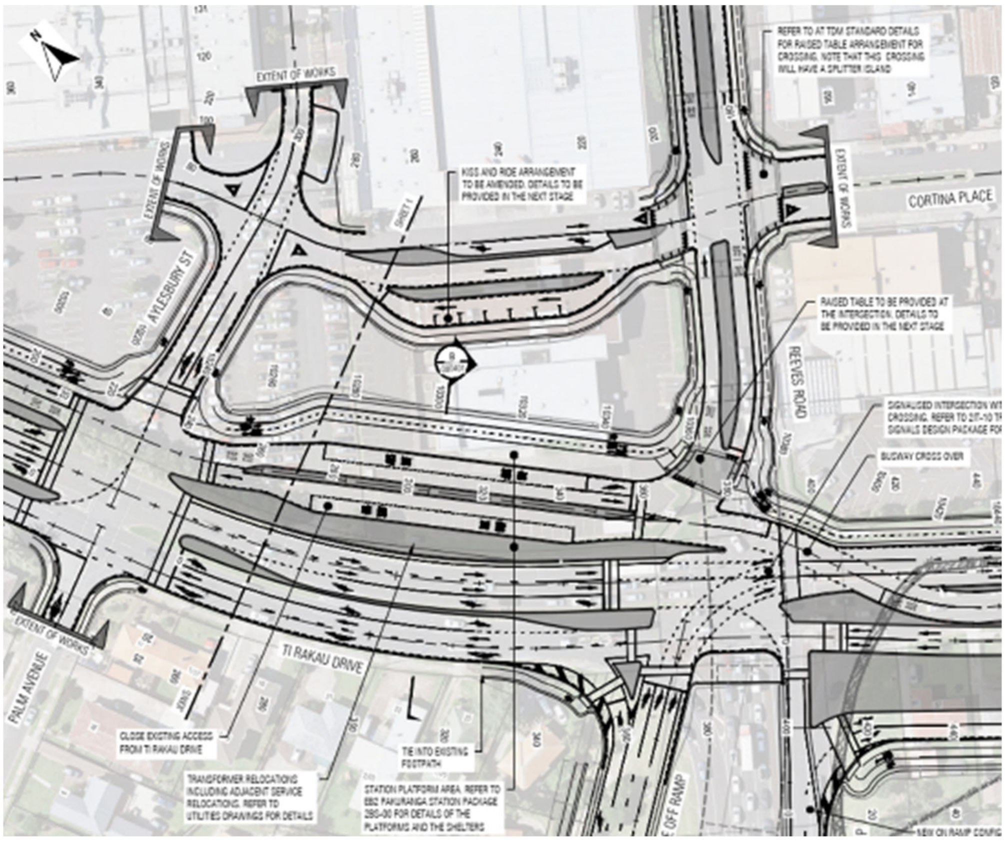



**Figure 106: Proposed Pakuranga Town Centre major interchange station layout**

### *6.4.1.2 Edgewater Drive*

An intermediate station will be provided in the centre of Ti Rakau Drive, near Edgewater Drive west. As above, the bus station will provide seating and sheltered cover for passengers as well as real-time service information. Bicycle and scooter storage will also be provided. The bus station will be accessible to pedestrians and cyclists from both sides of Ti Rakau Drive via separated footpaths, cycleways and signalised crossings. **Figure 107** shows the layout of the proposed bus station at Edgewater Drive.

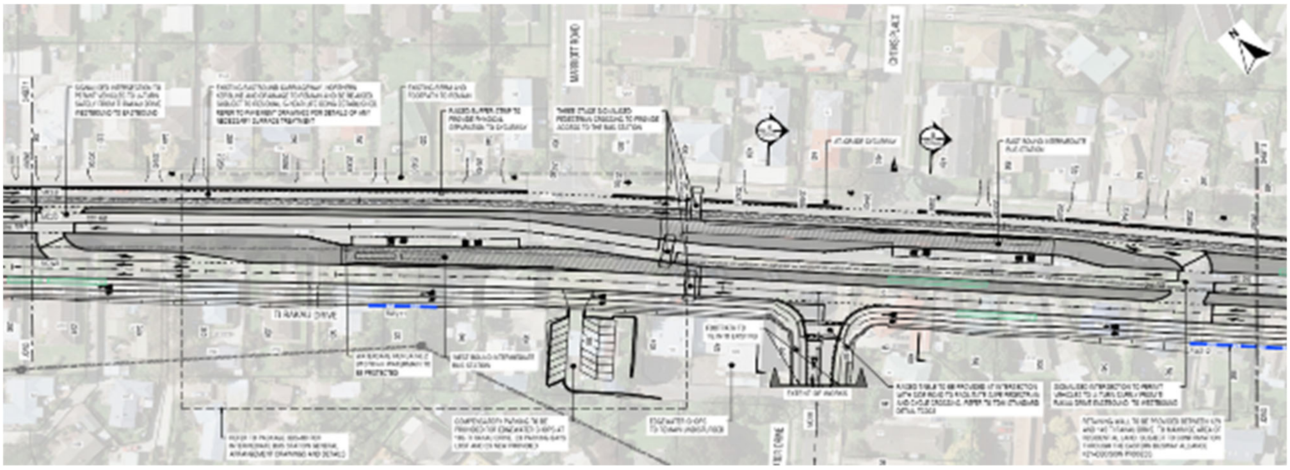


**Figure 107: Proposed Edgewater Dr intermediate station layout**

### *6.4.1.3 Gossamer Drive*

An intermediate station will also be provided along Ti Rakau Drive, near Gossamer Drive. The westbound station will be provided along the centre of Ti Rakau Drive, while the eastbound station will be provided on the northern side of the Ti Rakau Drive carriageway.

With the full Project in place (EB2, 3 and 4), the bus lanes will continue on the northern side of Ti Rakau Drive and across the Pakuranga Creek towards Burswood (subject to a separate resource consent process). However, for the purposes of this ITA, the central running bus lanes will terminate at the western approach of the Ti Rakau Drive / Gossamer Drive intersection. Buses departing from the eastbound station will merge back into general traffic before the Ti Rakau Bridge. Similar to the Edgewater Drive station, this station will also provide seating, sheltered cover, real-time service information, and bicycle and scooter storage. The bus station will be accessible to pedestrians and cyclists from both sides of Ti Rakau Drive via separated footpaths, cycleways and signalised crossings.

**Figure 108** below shows the layout of the proposed bus station at Gossamer Drive.

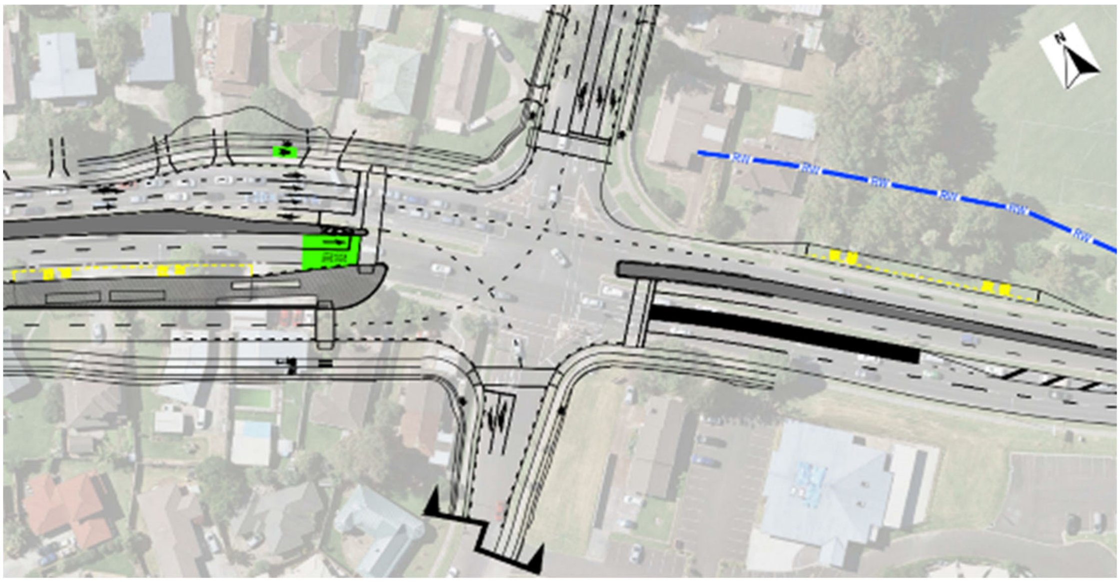



**Figure 108: Proposed Gossamer Dr intermediate station layout**

### 6.4.2 Future Patronage

Future patronage of bus services in the EB2 and EB3R project areas were determined from the MSM Auckland Regional Transport Models (EMME). These models forecast demands based on Auckland Council's Scenario I Modified Version 11.5 demographic and land use data. The outputs of these models include public transport demand and are based on a 2-hour period during the AM and PM Peaks.

**Table 40** provides a comparison of bus patronage, predicted by the 2018 Base Model and the 2028 EB2/EB3R Model, at each of the proposed bus station locations during the AM peak period. It should be noted that the public transport demand shown below is a combination of both inbound and outbound services at these locations.

**Table 40: AM peak period bus patronage – 2018 Base Model vs 2028 EB2/EB3R Model**

| Station | 2018 Base Model | | | 2028 EB2/EB3R Model | | |
|---|---|---|---|---|---|---|
| | Boarding | Alighting | Total | Boarding | Alighting | Total |
| Pakuranga Town Centre | 37 | 8 | **45** | 708 | 760 | **1,468** |
| Edgewater Dr | 72 | 0 | **72** | 378 | 85 | **463** |
| Gossamer Dr | 7 | 2 | **9** | 126 | 28 | **154** |

**Table 41** provides a comparison of bus patronage, between the 2018 Base Model and the 2028 EB2/EB3R Model, during the PM peak period.

**Table 41: PM peak period bus patronage – 2018 Base Model vs 2028 EB2/EB3R Model**

| Station | 2018 Base Model | | | 2028 EB2/EB3R Model | | |
|---|---|---|---|---|---|---|
| | Boarding | Alighting | Total | Boarding | Alighting | Total |
| Pakuranga Town Centre | 13 | 4 | **17** | 725 | 589 | **1,314** |
| Edgewater Dr | 50 | 0 | **50** | 77 | 223 | **299** |
| Gossamer Dr | 5 | 5 | **10** | 26 | 74 | **100** |

The proposed bus stations in the EB2 and EB3R project areas, as well as the proposed busway, are predicted to significantly increase public transport patronage during both the AM and PM peak periods. This trend is expected to continue throughout the day, leading to significant increases in daily public transport uptake.

As expected, the largest increase in bus patronage is predicted to occur at the major interchange station in the Pakuranga Town Centre. Nevertheless, the intermediate stations are also predicted to experience large increases in patronage, compared to the existing environment.

The benefit of increased public transport patronage is that it will lead to increased public transport mode share on the network. This will not only reduce congestion on the network, but will also reduce greenhouse gas emissions via a more sustainable movement of passengers through the network.

### 6.4.3 Platform Pedestrian Circulation

The level of service for customer circulation at the bus stations was determined based on the peak patronage at each location[39], with a target of LOS C (minimum 1.4 $m^2$ per person), for the peak 5-minute demand for boarding and peak 1-minute demand for alighting passengers. **Table 42** outlines the forecasted peak patronage by 2048, the resultant platform area required and the platform footprint of the design at each of the stations.

**Table 42: Station patronage and platform area**

| Station | Direction | AM Peak period | | PM Peak Period | | Design Platform Footprint [$m^2$] |
|---|---|---|---|---|---|---|
| | | Peak Patronage | Area Required [$m^2$] | Peak Patronage | Area Required [$m^2$] | |
| Pakuranga Town Centre | Inbound | 73 | 102 | 60 | 84 | **165** |
| | Outbound | 41 | 57 | 45 | 63 | |
| Edgewater Dr | Inbound | 18 | 25 | 24 | 34 | **105** |
| | Outbound | 18 | 25 | 9 | 13 | |
| Gossamer Dr | Inbound | 18 | 25 | 24 | 34 | **105** |
| | Outbound | 18 | 25 | 9 | 13 | |

All station platform areas are being well provided for, with all stations requiring less area compared to provided platform footprint in the proposed design.

[39] EB234-2-TE-RP-Z0-0001_A1_Traffic Modelling and Analysis Report

#### 6.4.4 Bus Station Loading Areas

An assessment was undertaken to determine the number of bus bays or loading areas at each of the bus stations, based on forecast patronage (EMME model) and bus numbers (provided by AT Metro) by 2048[40]. The assessment methodology to determine the number of bus bays and therefore the number of platforms required was determined using guidance from the Transit Capacity and Quality of Service Manual – Part 2 Transit Capacity (TCQSM). This included employing a given set of operating conditions and probability of acceptance of a bus entering a bus bay without delay.

**Table 43** summarises the number of platforms and bus bays at each of the bus stations.

**Table 43: Platform and bus bay requirements**

| Station | No. of Buses per Peak Hour | No. of Platforms (Inbound) | No. of Bus Bays (inbound) | No. of Platforms (Outbound) | No. of Bus Bays (Outbound) |
|---|---|---|---|---|---|
| Pakuranga Town Centre | 74 | 1 | 3 | 1 | 3 |
| Edgewater Dr | 38 | 1 | 2 | 1 | 2 |
| Gossamer Dr | 38 | 1 | 2 | 1 | 2 |

The major interchange station in the Pakuranga Town Centre will consist of one platform per direction with three bus bays upon completion. The intermediate bus stations at Edgewater Drive and Gossamer Drive will consist of one platform per direction, each providing two bus bays upon completion, with the capability of providing a third bus bay in the future. Appropriate platforms and number of bus bays have been provided in the proposed design to cater for the predicted patronage and bus services by 2048.

#### 6.4.5 Future Bus Services and Routes

The majority of bus services currently serving the EB2 and EB3R project areas will continue to do so by 2028, once EB2 and Eb3R are operational. These include the 70, 72X, 352, 711 and 712 services. It is anticipated by AT that the 72C and the 72M services will be combined into one new 72 service. In addition, two new services will be added to the network; the 705 service between Meadowlands and Panmure, and the 706 service between Flatbush and Panmure.

The new 705 service will travel along Picton Street, Selwyn Road, Granger Road, Litten Road, Sandspit Road, Meadowland Drive, Millhouse Drive, Botany Road, along Ti Rakau Drive through the EB2 and EB3R project areas, on Pakuranga Road and will terminate at the Panmure Train Station.

The new 706 service will travel along Ormiston Road, Murphys Road, Stancombe Road, Chapel Road, along Ti Rakau Drive through the EB2 and EB3R project areas, on Pakuranga Road and will terminate at the Panmure Train Station.

The route of the 35 service will be extended northwards from Botany Town Centre, along Chapel Road, Whitford Road, Cook Street, and Picton Street to replace the 72C service along these roads. The new 72 service will cover the same route as the 72M service from Botany to Howick, but with higher frequencies. From Picton Street, the new 72 service will replace both the 72C and 72M services as it heads along Ridge Road and Pakuranga Road towards Panmure.

[40] EB234-2-TE-RP-Z0-0001_A1_Traffic Modelling and Analysis Report

Services currently operating along Ti Rakau Drive, such as the 70 and 352 services, will continue to do so with no changes to their routes. The 711 service will experience a minor route change, specifically the 711 inbound service. The route of the 711 inbound service will in future proceed along Reeves Road towards Ti Rakau Drive and the new bus station in the Pakuranga Town Centre.

The services operating along Pakuranga Road will also experience a minor route change. The 72X, 712 and the new 72 services will turn off Pakuranga Road, at the intersection with the RRF, and onto the new bus lanes towards Reeves Road. These services will continue along Reeves Road towards Ti Rakau Drive and the new Pakuranga Town Centre bus station. **Figure 109** below shows the future bus services and routes that will be operating in the EB2 and EB3R project areas upon completion.


**Figure 109: Future bus services and routes in the EB2 and EB3R project areas**

In future, all bus services along Ti Rakau Drive will travel in dedicated bus lanes through the EB2 and EB3R project areas, as opposed to the general traffic lanes in the existing environment. All bus services travelling along Pakuranga Road will turn onto the new dedicated bus lanes alongside the RRF towards Reeves Road and Ti Rakau Drive. Overall, the new routes and the bus lanes are predicted to lead to significant improvements in bus travel times and patronage levels. The sections below discuss the improvements in bus service headways as well as the expected improvements in bus travel times.

### 6.4.6 Service Headways

**Table 44** below provides a comparison of the bus service headways, between the existing environment and EB2/EB3R upon completion by 2028, during the AM, IP and PM peak periods. These include the 70, 72C, 72M, 72, 72X, 352, 705, 706, 711 and 712 services.

**Table 44: Service headways – Existing Environment vs EB2/EB3R (2028)**

| Service Description | Direction | Existing Environment | | | EB2/EB3R 2028 | | |
|---|---|---|---|---|---|---|---|
| | | AM Headway [min] | IP Headway [min] | PM Headway [min] | AM Headway [min] | IP Headway [min] | PM Headway [min] |
| 70 – Botany to Auckland CBD | Inbound | 8 | 10 | 10 | 5 | 7 | 7 |
| | Outbound | 10 | 7 | 7 | 7 | 7 | 5 |
| 72C – Botany and Howick to Panmure | Inbound | 20 | 30 | 30 | - | - | - |
| | Outbound | 30 | 30 | 20 | - | - | - |
| 72M – Botany and Howick to Panmure | Inbound | - | 30 | 30 | - | - | - |
| | Outbound | 30 | 30 | - | - | - | - |
| 72 – Botany and Howick to Panmure (replacement for 72C and 72M) | Inbound | - | - | - | 5 | 12 | 15 |
| | Outbound | - | - | - | 15 | 12 | 5 |
| 72X – Botany and Howick to Auckland CBD | Inbound | 10 | - | - | 10 | - | - |
| | Outbound | - | - | 10 | - | - | 10 |
| 352 – Manukau to Panmure | Inbound | 20 | 20 | 20 | 12 | 12 | 12 |
| | Outbound | 20 | 20 | 20 | 12 | 12 | 12 |
| 705 – Meadowlands to Panmure (new route) | Inbound | - | - | - | 15 | - | - |
| | Outbound | - | - | - | - | - | 15 |
| 706 – Flatbush to Panmure (new route) | Inbound | - | - | - | 15 | - | - |
| | Outbound | - | - | - | - | - | 15 |
| 711 – Howick to Panmure | Inbound | 20 | 60 | 60 | 15 | 30 | 30 |
| | Outbound | 60 | 60 | 20 | 30 | 30 | 15 |
| 712 – Bucklands Beach to Panmure | Inbound | 23 | 30 | 30 | 10 | 20 | 20 |
| | Outbound | 30 | 30 | 20 | 20 | 20 | 10 |

Service headways will improve for the 70 service during all periods of the day. The benefit of this will be an increase in public transport patronage, especially during the peak periods.

Again, it is anticipated that the 72C and 72M services will be combined into one new 72 service. The new 72 service will provide improved headways compared to the services it is replacing. The 72 service headways will be 5 mins in the peak direction (AM = inbound, PM = outbound), 12 mins during the IP periods, and 15 mins in the off-peak direction.

It is expected that the service headways for the 72X service will remain the same upon completion of EB2 and EB3R. The frequencies are expected to be sufficient to service the predicted patronage by 2028 along this route.

Service headways of the 352 service will improve significantly, compared to the existing environment. It is expected that 12 min headways will be provided for this service across all of the periods.

Initially, the new 705 and 706 services are expected to run at 15 min headways in the peak directions only (AM = inbound, PM = outbound), with the capacity to expand the timetable if required in the future.

The 711 service headways will improve to 15 min in the peak directions, while service headways will be halved during the IP periods and the off-peak directions.

The 712 service headways will be halved for the peak directions, to 10 minutes, while the IP period and off-peak service headways will be improved to 20 minutes.

As above, these improved service headways will significantly increase public transport patronage and as a result lead to increased public transport mode share on the network. This will not only reduce congestion, but will also reduce greenhouse gas emissions by way of a more sustainable movement of passengers through the network.

### 6.4.7 Bus Travel Time

Bus route travel times were determined using the AIMSUN model, with a 2028 horizon year. The same bus routes presented in **Section 5.3.5**, with the addition of the new 72, 705 and 706 services, are assessed here for permanent effects to bus travel times in the EB2/EB3R Final Scenario. **Table 45** below provides a comparison of the bus route travel times between the Do-Minimum and EB2/EB3R Final scenarios, with a 2028 horizon year.

**Table 45: Bus travel times – Do-Minimum vs EB2/EB3R Final (2028)**

| AM Peak | | | | | | |
|---|---|---|---|---|---|---|
| Route Description | Westbound | | | Eastbound | | |
| | Do Minimum [min] | EB2/EB3R Final [min] | Difference [min] | Do Minimum [min] | EB2/EB3R Final [min] | Difference [min] |
| 70 – Botany to Auckland CBD | 42.3 | 29.3 | -13.0 | 26.9 | 30.3 | 3.4 |
| 72C – Botany and Howick to Panmure | 20.6 | - | - | 16.0 | - | - |
| 72M – Botany and Howick to Panmure | - | - | - | 15.8 | - | - |
| 72 – Botany and Howick to Panmure | - | 21.0 | - | - | 20.1 | - |
| 72X – Botany and Howick to Auckland CBD | 24.6 | 25.6 | 1.0 | - | - | - |
| 352 – Manukau to Panmure | 36.8 | 25.1 | -11.7 | 29.1 | 28.2 | -0.9 |
| 705 – Meadowlands to Panmure | - | 29.7 | - | - | - | - |
| 706 – Flatbush to Panmure | - | 25.9 | - | - | - | - |
| 711 – Howick to Panmure | 29.1 | 27.8 | -1.3 | 22.7 | 25.5 | 2.8 |
| 712 – Bucklands Beach to Panmure | 22.6 | 24.1 | 1.5 | 16.6 | 17.9 | 1.3 |
| **PM Peak** | | | | | | |
| Route Description | Westbound | | | Eastbound | | |
| | Do Minimum [min] | EB2/EB3R Final [min] | Difference [min] | Do Minimum [min] | EB2/EB3R Final [min] | Difference [min] |
| 70 – Botany to Auckland CBD | 35.7 | 29.9 | -5.8 | 38.1 | 31.1 | -7.0 |
| 72C – Botany and Howick to Panmure | 14.6 | - | - | 14.8 | - | - |
| 72M – Botany and Howick to Panmure | 15.0 | - | - | - | - | - |
| 72 – Botany and Howick to Panmure | - | 16.9 | - | - | 20.0 | - |
| 72X – Botany and Howick to Auckland CBD | - | - | - | 16.8 | 24.7 | 7.9 |
| 352 – Manukau to Panmure | 33.4 | 32.3 | -1.1 | 27.9 | 32.4 | 5.5 |
| 705 – Meadowlands to Panmure | - | | - | - | | - |
| 706 – Flatbush to Panmure | - | | - | - | | - |
| 711 – Howick to Panmure | 23.8 | 24.6 | 0.8 | 24.5 | 32.2 | 7.7 |
| 712 – Bucklands Beach to Panmure | 19.7 | 22.0 | 2.3 | 18.1 | 25.9 | 7.8 |

The 70 and 352 services, which travel along Ti Rakau Drive in the EB2 and EB3R project areas, are predicted to experience significant improvements in travel times during the AM peak in the westbound (inbound) direction. In the eastbound (outbound) direction, the 70 service is predicted to experience a negligible increase in travel times, while a small improvement is predicted for the 352 service. Both of these services will be running at higher frequencies during all periods of the day.

The new 72 route is predicted to have marginally longer travel times, in both directions during the AM peak, compared to the 72C and 72M routes it is replacing. However, the new 72 service will be running at higher frequencies in both directions.

The 72X, 711 and 712 routes are predicted to experience negligible increases, or in some cases small improvements, in both directions during the AM peak. Again, while service headways for the 72X service are expected to remain the same, headways for the 711 and 712 service will be significantly improved in the future.

The 70 service is predicted to experience improvements in travel times during the PM peak in both directions upon completion of EB2 and EB3R. The combination of improved travel times and higher service frequencies will lead to a faster and more reliable public transport trip between Botany and the Auckland CBD.

Similar to the AM peak, the new 72 service is predicted to have marginally longer travel times, in both directions, during the PM peak compared to the routes it is replacing. However, the new 72 will be running at higher frequencies.

Travels times for the 72X, 711 and 712 services are predicted to increase in the outbound (eastbound) direction during the PM peak. This is likely due to the route changes of these services, particularly the additional number of intersections these services have to pass through. Again, while service frequencies for the 72X are expected to remain the same, service headways for the 711 and 712 services however will be significantly improved. Furthermore, the integration off all services at the Pakuranga Town Centre station will provide for an improved transfer experience between services. Passengers will not be required to walk across the Pakuranga Plaza to transfer between services on Pakuranga Road and Ti Rakau Drive.

The 352 service is predicted to experience an increase in travel times in the outbound (eastbound) direction during the PM peak. This is likely due to the operation of the Ti Rakau Drive / Gossamer Drive intersection. As stated in **Section 6.3.2,** the proposed design of the Ti Rakau Drive / Gossamer Drive intersection under this assessment (EB2/EB3R only), is not identical to the proposed design of the intersection under the full Project (EB2, 3 and 4). Under the full Project, the intersection would have a more efficient geometric layout, and as a result would also have a more efficient traffic signal phasing. Therefore, additional travel time savings would be likely upon completion of the whole Project.

Overall, bus travel times are predicted to improve across the network during the AM and PM peaks. The combination of improved travel times and higher service frequencies will lead to faster and more reliable public transport trips. In some cases where bus services are not expected to experience improvements in travel times, these services will still be improved in the form of the new bus stations, improved reliability and efficiency, and increased service frequencies.

### 6.4.8 School Bus Services

The S415 school bus service between Pakuranga and Sacred Heart College will in future also benefit from EB2. The S415 will depart from the Pakuranga Town Centre bus station, in the AM peak, and head westbound along the new Ti Rakau Drive bus lanes. At the intersection with Pakuranga Road, the S415 will join onto the EB1 bus lanes. In the afternoon, the S415 will return down Pakuranga Road, turning right onto the new Ti Rakau Drive bus lanes and terminate at the Pakuranga Town Centre bus station.

The S416 school bus service between Botany and Sacred Heart College will in future also benefit from EB2 as well as EB3R. In the AM peak, students will be able to board the S416 at the Gossamer Drive, Edgewater Drive and Pakuranga Town Centre bus stations as the service travels westbound along the new bus lanes on Ti Rakau Drive. As above, the S416 will turn left onto the EB1 Pakuranga Road bus lanes. In the afternoon, the S416 will return down the new Ti Rakau Drive bus lanes and students will be able to alight at the new EB2 and EB3R bus stations.

In the future, the S440 school bus service between Bucklands Beach and Sancta Maria College and Primary will remain on its current route and students will board and alight at the existing bus stops. The S440 will continue to proceed southbound on Gossamer Drive and turn left at the Ti Rakau Drive / Gossamer Drive intersection into the general traffic lanes and will not stop at the new Gossamer eastbound station in the AM peak. In the afternoon, the S440 will continue to turn right from Ti Rakau Drive onto Gossamer Drive from the general traffic lanes, and will not be able to stop at the Gossamer Drive westbound station.

The S013 school bus service between Otara and Edgewater College will in future continue to travel westbound along Ti Rakau Drive in the general traffic lanes during the AM peak, and will turn left into Edgewater Drive east. It will not stop on Ti Rakau Drive in the EB3R project area. In the afternoon, the S013 will experience a small change to its route. As the S013 departs from Edgewater College, the service will turn left at the Ti Rakau Drive / Edgewater Drive west intersection into the westbound general traffic lanes. The service will execute a U-turn manoeuvre at the western U-turn facility on Ti Rakau Drive and proceed as normal along the eastbound general traffic lanes. Again, the S013 will not stop along Ti Rakau Drive. The permanent effects to this school bus service are considered to be negligible.

In the future, the S073 school bus service between Otahuhu and Edgewater College will continue to turn right from SEART onto the eastbound general traffic lanes on Ti Rakau Drive, during the AM peak. The service will not be able to use the EB2 and EB3R bus lanes nor the Pakuranga Town Centre and Edgewater bus stations. The service will not stop along Ti Rakau Drive. As the Edgewater Drive west intersection is left-in left-out only in the proposed design, the S073 will experience a small change to its route. The service will proceed eastbound along Ti Rakau Drive and execute a U-turn manoeuvre at the eastern U-turn facility, to be able to turn left into Edgewater Drive west. In the afternoon, the S073 will continue to turn left onto the westbound Ti Rakau Drive general traffic lanes at Edgewater Drive west and head towards SEART. Again, the service will not be able to use the new bus lanes nor the new bus stations and will not stop along Ti Rakau Drive. The permanent effects to this school bus service are considered to be negligible.

Overall, school bus services travelling in the bus lanes are expected to experience similar travel time improvements as presented in **Section 6.4.7** and services travelling in the general traffic lanes are expected to experience similar travel time improvements as presented in **Section 6.3.3**.

## 6.5 Effects to Pedestrians and Cyclists

The Project will provide dedicated footpaths and cycleways to improve pedestrian and cyclist amenity and safety. Further benefits of this infrastructure will be greater connectivity and accessibility not only across the network, but especially in proximity to the bus stations, resulting in increased catchment as well as the potential for mode shift to occur.

In the EB2 and EB3R project areas, a combination of bidirectional and unidirectional cycleways will be provided along Ti Rakau Drive between Pakuranga Road and Gossamer Drive. Unidirectional cycleways will also be provided on Pakuranga Road between Ti Rakau Drive and the RRF. The majority of the existing footpaths will be retained while new footpaths will be provided along sections of Ti Rakau Drive, William Roberts Road, Cortina Place and Mattson Road.

In the future, raised tables (raised pedestrian platforms) will be implemented across all priority-controlled side streets along the southern side of Ti Rakau Drive in the EB2 and EB3R project areas. These include:

- Palm Avenue
- Tiraumea Drive
- Roseburn Place
- Edgewater Drive west
- Wheatley Avenue
- Edgewater Drive east

Raised tables will also be implemented in Pakuranga Town Centre area, across both the western and eastern approaches at the Reeves Road / Cortina Place intersection and the northern approach at the Ti Rakau Drive / Reeves Road / SEART intersection. **Figure 110** shows an example of a raised table in the proposed design at the Ti Rakau Drive / Edgewater west intersection.

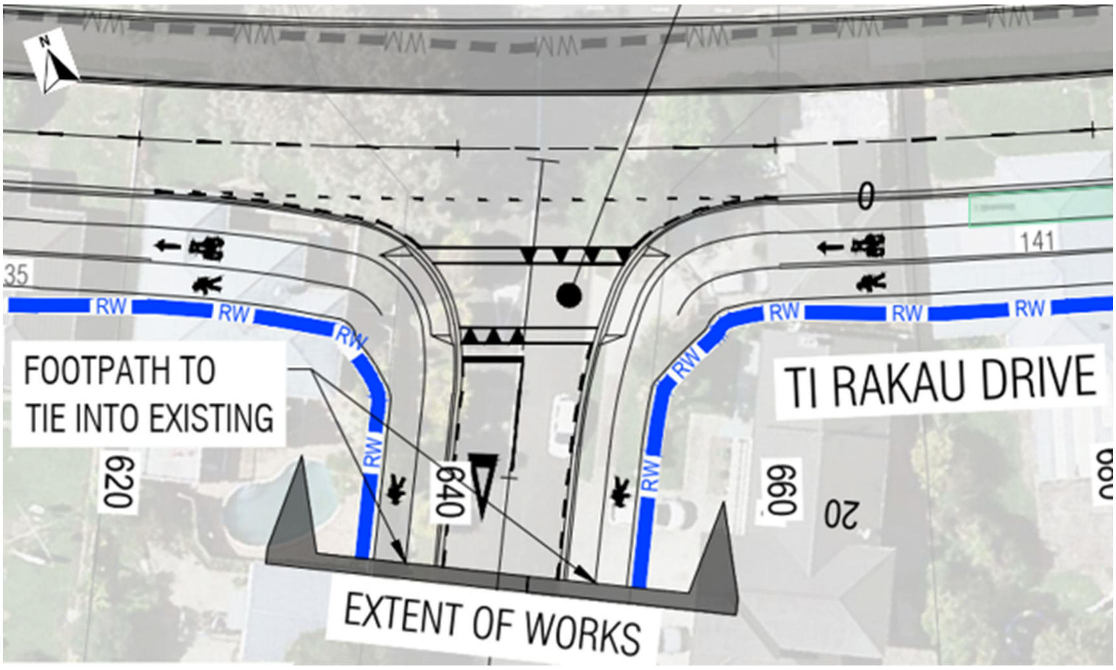



**Figure 110: Example of raised tables in the proposed design**

The presence of these crossing facilities will aid pedestrians and cyclists by simplifying the crossing task, increasing visibility by creating a visual cue for drivers to reduce their speed as they approach the intersections, and encourage courtesy between drivers and pedestrians. This will reduce the risk of potential conflict between vehicles and pedestrians. It should be noted that these raised tables will not be marked as formal pedestrian crossings.

Compared to the existing environment, signalised pedestrian and/or cycle crossings will be provided more frequently along Ti Rakau Drive. Users will have safe and more direct travel routes, which will provide a connected network that encourages active modes. Signalised pedestrian crossings will be provided across all approaches of the following intersections:

- Pakuranga Road / Ti Rakau Drive
- Ti Rakau Drive / Aylesbury Street / Palm Avenue
- Ti Rakau Drive / Reeves Road / SEART
- William Roberts Road / Reeves Road
- Ti Rakau Drive / Gossamer Drive

Signalised pedestrian crossings will be provided across the southern, western and northern approaches at the Reeves Road / Aylesbury Street intersection. Signalised pedestrian crossings will also be provided on the western and northern approaches at the Ti Rakau Drive / William Roberts Road intersection and the eastern and southern approaches at the Ti Rakau Drive / Mattson Road intersection. Additionally, a pedestrian crossing will also be provided at the Edgewater bus station. Lastly, the existing signalised pedestrian crossing on Pakuranga Road, constructed as part of EB1, will remain. The existing midblock pedestrian crossing on Reeves Road will be removed to avoid potential sightline issues. This is because the columns of the RRF will be located along the centre of Reeves Road, which may obstruct the view of pedestrians to vehicles.

Bidirectional cycleways will be provided along the northern side of Ti Rakau Drive, between Pakuranga Road and Reeves Road, while unidirectional cycleways will be provided along both sides of Ti Rakau Drive between Reeves Road and Gossamer Drive. Unidirectional cycleways will also be provided on both sides of Pakuranga Road between Ti Rakau Drive and the RRF. Together, these cycleways will tie into the existing cycleways provided on Pakuranga Road west of Ti Rakau Drive, as part of EB1.

Providing dedicated cycleways creates a physically separated and safe space that facilitates cycle movements through the network. This provides users with a more attractive mode of travel and supports the uptake of cycling. Furthermore, the cycleways will facilitate improved accessibility to the bus stations, increasing uptake of public transport across the network. Signalised shared pedestrian and cyclist crossings will be provided at the following intersections:

- Northern approach of Pakuranga Road / Ti Rakau Drive
- Northern approach of Ti Rakau Drive / Aylesbury Street / Pam Avenue
- Eastern approach of Ti Rakau Drive / Reeves Road / SEART
- Northern approach of Ti Rakau Drive / William Roberts Road
- Southern approach of Ti Rakau Drive / Mattson Road
- Western approach of Ti Rakau Drive / Gossamer Drive

Overall, pedestrian and cyclist amenity and safety will be improved. The Project will also provide greater accessibility and connectivity to public transport, increasing catchment and mode shift.

## 6.6 Effects to Property Access and Parking

### 6.6.1 EB2 – Reeves Road

The proposed design of Reeves Road in the EB2 project area does not provide any on-street parking. However, no on-street parking is provided in the existing environment. Therefore, the proposed design will have no effects on on-street parking.

#### *6.6.1.1 3 Reeves Road (Gull Service Station)*

**Figure 111** shows the location and property boundary of 3 Reeves Road, as well as the Gull service station (red outline) developed on the site. Access to the property from Reeves Road will not be maintained in the proposed design as the section of Reeves Road between TI Rakau Drive and Cortina Place will be bus only. Discussions regarding compensation are ongoing with the owner regarding loss of direct road access onto Reeves Road as part of the Public Works Act process.

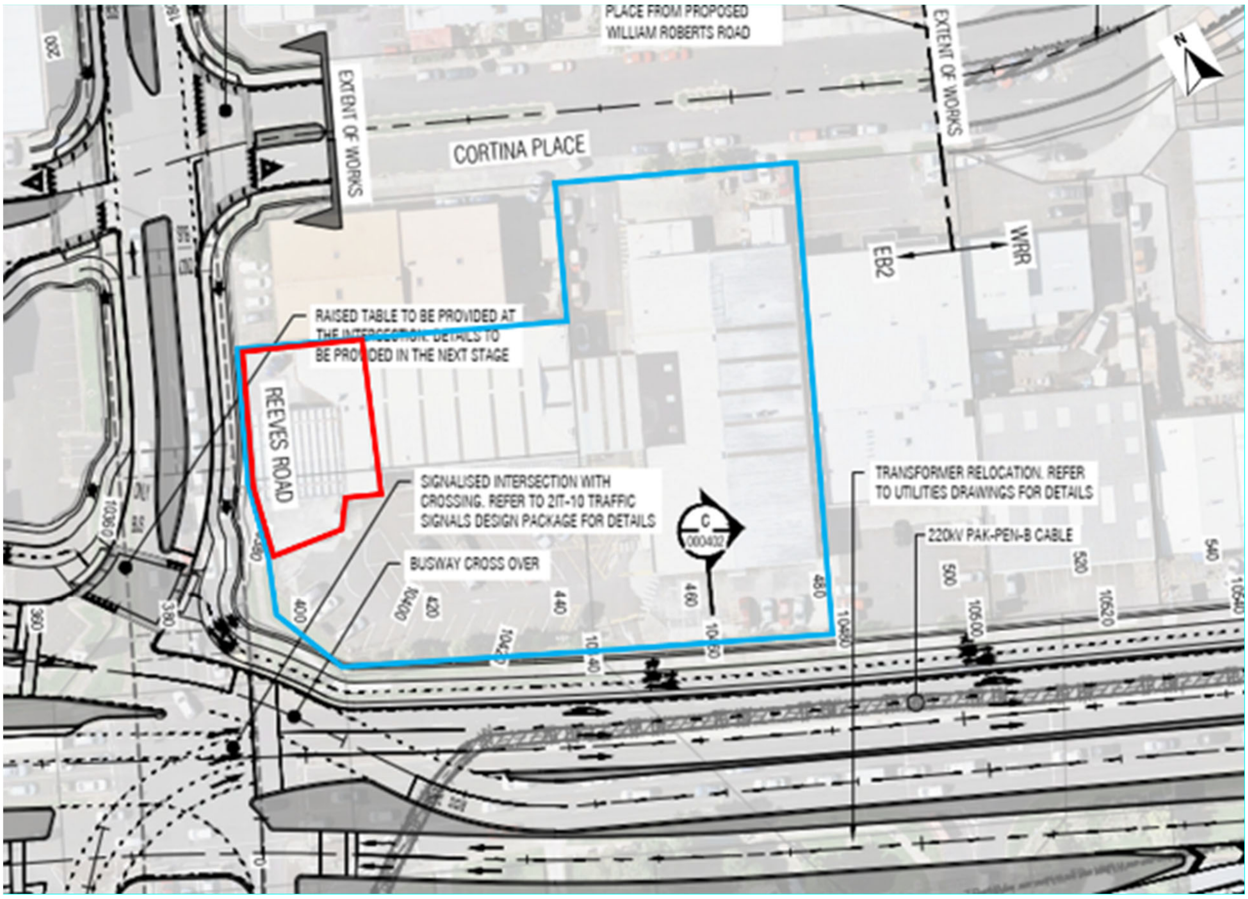



**Figure 111: 3 Reeves Rd and Gull service station (red outline) upon completion**

### 6.6.1.2 2 Cortina Place and 5 Reeves Road

As stated in **Section 5.1.1.1**, the properties at 2 Cortina Place and 5 Reeves Road have been acquired by AT and will be used as site offices during construction. Upon completion, these properties will be handed back or will be demolished for redevelopment in the future. **Figure 112** shows the location of 2 Cortina Place (yellow outline), 5 Reeves Road (blue outline) and the proposed design of the adjacent roads.

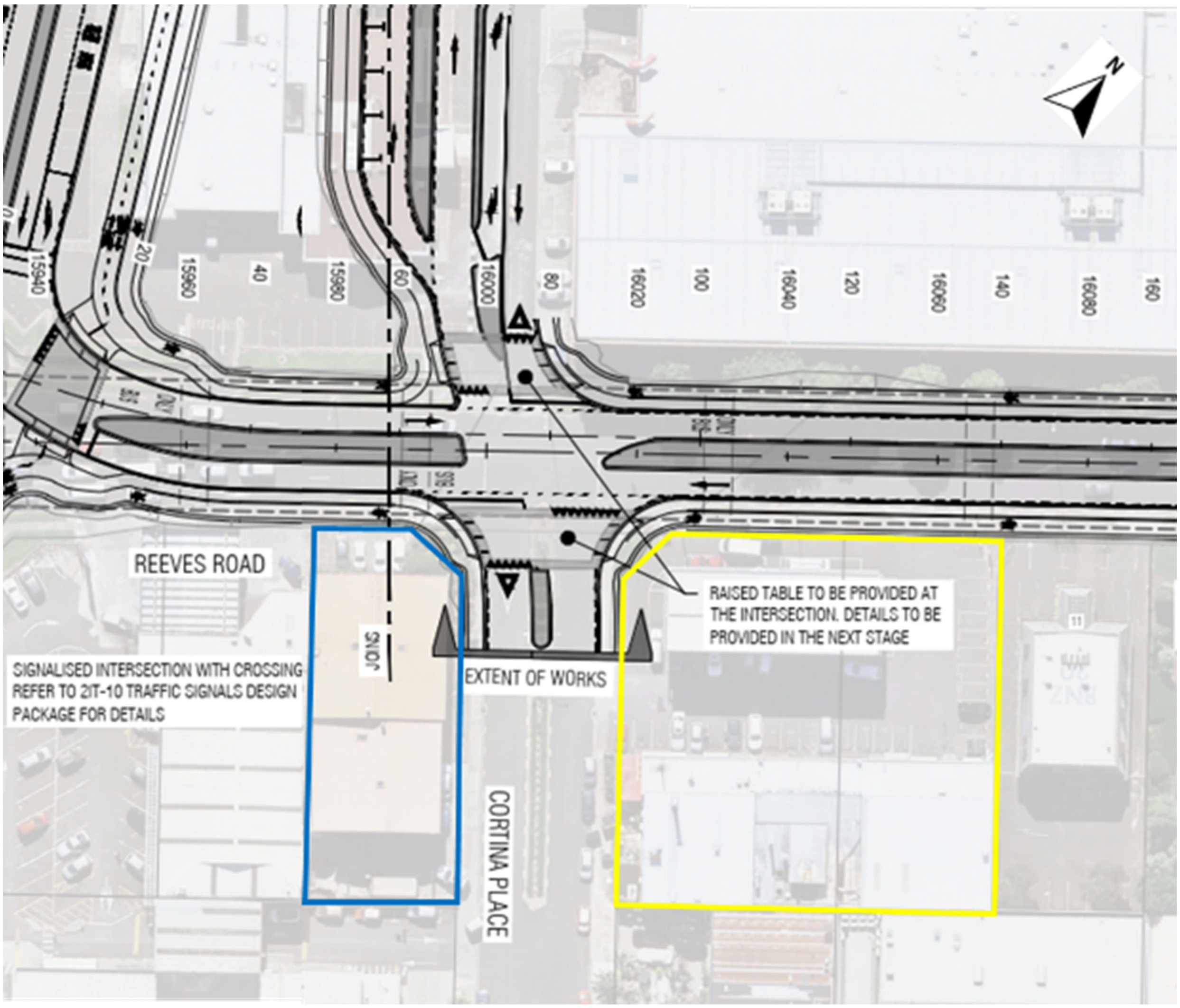



**Figure 112: 2 Cortina Pl (yellow outline) and 5 Reeves Rd (blue outline) upon completion**

The property at 5 Reeves Road will in future have no vehicle access from Reeves Road as the section of Reeves Road between Ti Rakau Drive and Cortina Place will be bus only. The property will however still be accessible via Cortina Place.

Upon completion, vehicle access from Reeves Road to the property at 2 Cortina Place will be reinstated. In future, the access from Reeves Road will be left-in/left-out only. However, this access will be in addition to the existing access off Cortina Place. Permanent effects to property access and parking at these properties are considered to be negligible.

#### 6.6.1.3 11 Reeves Road (Eastside Pups Dog Grooming and Daycare)

Vehicle access from Reeves Road to the property at 11 Reeves Road will be reinstated once construction of the RRF and ground level works have been completed. The access will be left-in/left-out only due to the location of the columns of the RRF and potential sightline issues of opposing traffic. Although the access will be somewhat different compared to the existing environment, the permanent effects to property access are expected to be very low. **Figure 113** shows the location of 11 Reeves Road (blue outline) and the proposed design of Reeves Road.

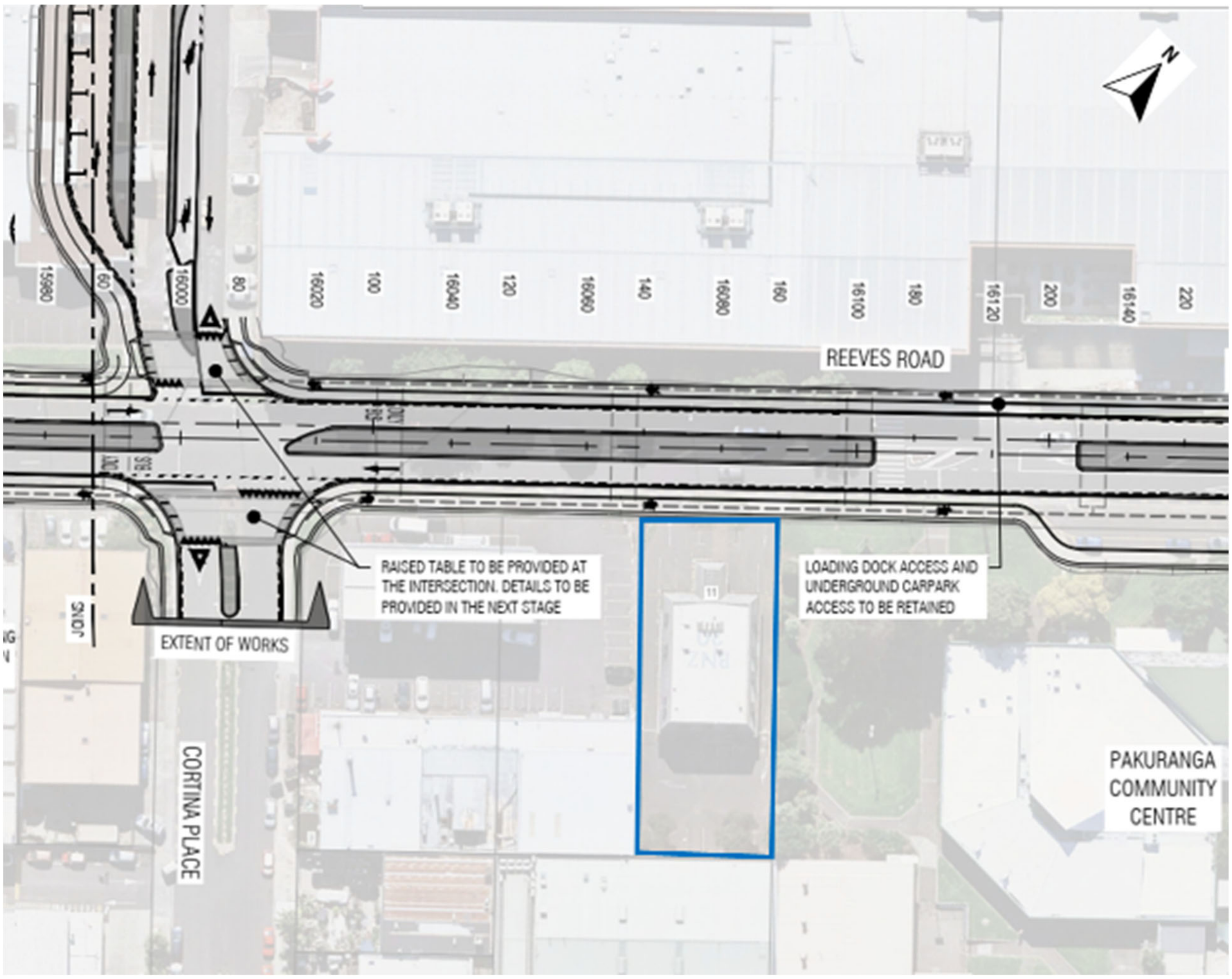



**Figure 113: 11 Reeves Rd (blue outline) upon completion**

### 6.6.1.4 13R Reeves Road (Te Tuhi)

Upon completion of the Reeves Road, access to the property at 13R Reeves Road (Pakuranga Community Centre) will be reinstated largely similar to the existing environment, and the temporary drop-off along William Roberts Road will be removed. Permanent effects to property access are expected to be negligible. **Figure 114** shows the location of the Te Tuhi development on 13R Reeves Road (blue outline) and the permanent access arrangement at the property.

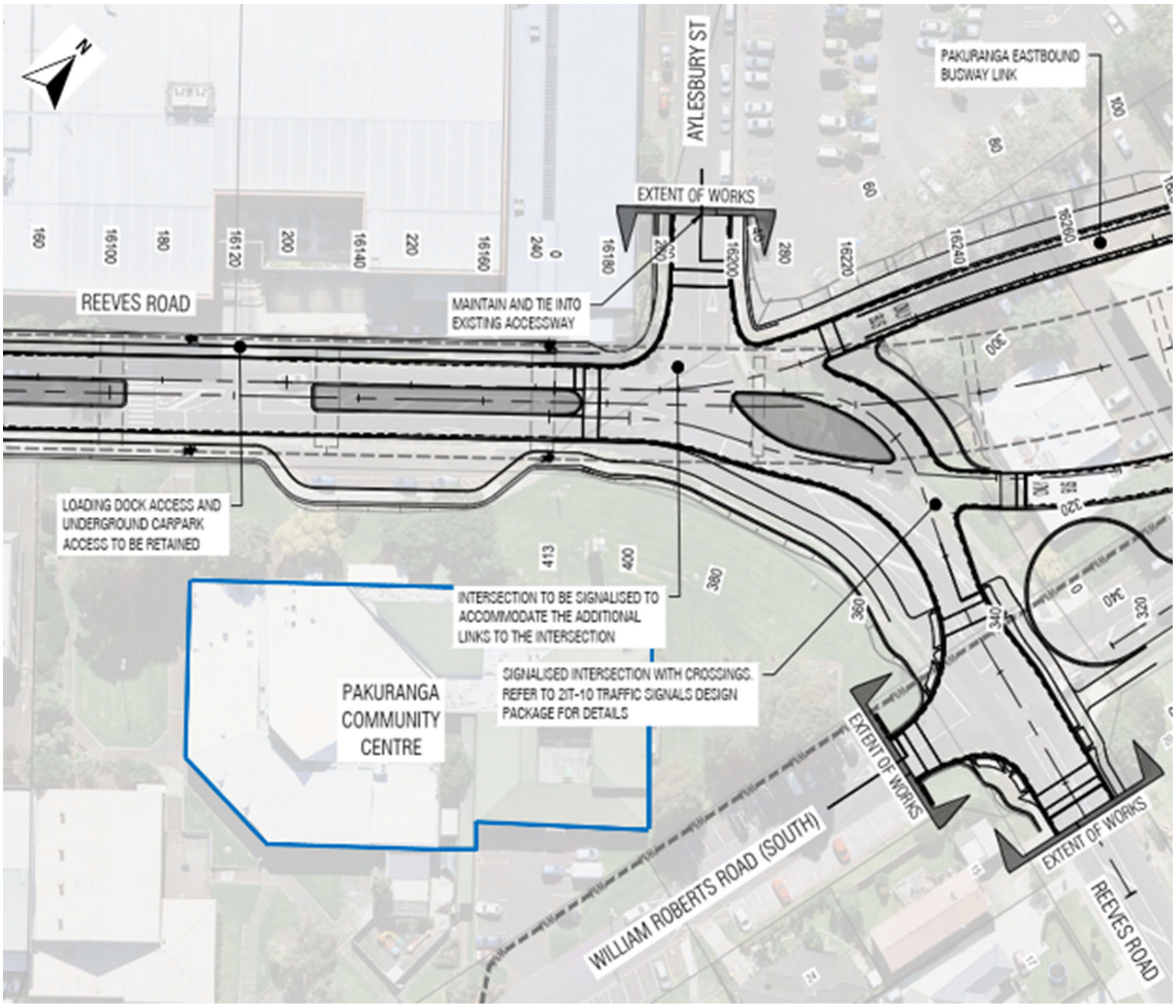



**Figure 114: 13R Reeves Rd upon completion**

#### *6.6.1.5 7 Aylesbury Street and 2R Ti Rakau Drive (The Warehouse and Pakuranga Library)*

Upon completion of Reeves Road, access to The Warehouse's goods access will be reinstated as per the existing environment (left-in left-out) with delivery vehicles approaching from the south via Cortina Place and exiting to the north on Reeves Road. A similar access arrangement will be provided to the Library service entrance. Access to the undercover carpark will be provided via Cortina Place to the south and Reeves Road to the north. **Figure 115** shows the permanent access arrangements at 7 Aylesbury Street (blue outline) and 2R Ti Rakau Drive (yellow outline) upon completion.

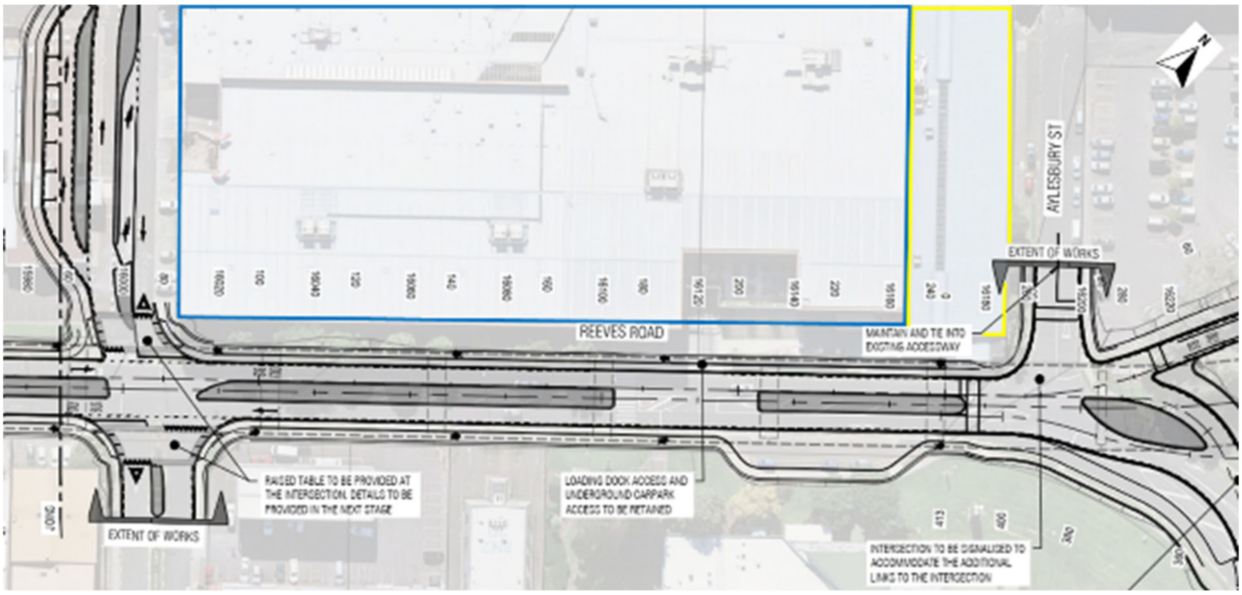



**Figure 115: 7 Aylesbury St (blue outline) and 2R Ti Rakau Dr (yellow outline) upon completion**

Permanent effects to property access, upon the completion of construction, are expected to be negligible as these access arrangements are largely similar to the existing environment and background traffic volumes on Reeves Road will be significantly reduced.

### 6.6.2 EB2 – William Roberts Road

#### *6.6.2.1 William Roberts Road North*

Upon completion, William Roberts Road north will no longer function as a through route between Reeves Road and Pakuranga Road, but rather as a local road to the surrounding residential properties. Each end of William Roberts Road north will be converted to a cul-de-sac with access off Ayr Road, and will provide ample on-street parking to the surrounding properties. Accesses to the remaining properties on the eastern side of the road will be maintained as per the existing environment. Overall, less through traffic will travel on William Roberts Road north, improving safety and the increased travel distance via Ayr Road to Lewis Road of roughly 300 m is considered to be negligible. Therefore, permanent effects to property access and parking are considered to be negligible.

#### *6.6.2.2 William Roberts Road South*

As stated in the WRRE ITA, the proposed WRRE design will result in the permanent loss of 12 parking spaces on William Roberts Road south, near the Pakuranga Leisure Centre and Ti Rakau Park.

Further north on William Roberts Road south, a total of 42 on-street parking spaces are provided at a 90˚ angle to the carriageway. To improve the safety of vehicles turning out from these parking spaces, and to avoid tracking curves passing over the road centre line, the angle of these parking spaces will be adjusted (see **Figure 116**). The proposed EB2 design will provide 20 fewer on-street parking spaces.


**Figure 116: William Roberts Rd south parking adjustments**

Therefore, the combined loss of on-street parking along William Roberts Road south due to the proposed design of WRRE and EB2, is 32 parking spaces.

Of the 32 parking spaces lost along William Roberts Road south, 16 parking spaces are located within Open Space zoned land (blue outline, see **Figure 117** below) and will require mitigation which is outlined below. The remaining 16 parking spaces are located within the road reserve (red outline below). As stated in **Section 3.7.3**, the average parking utilisation on William Roberts Road is not expected to exceed 49% on weekdays and 33% on weekends based on observations of current utilisation. Therefore, the permanent effects of the loss of these 16 parking spaces are considered to be very low.


**Figure 117: William Roberts Rd south zoning and on-street parking**

It is proposed that a new off-street parking area will be constructed in Ti Rakau Park with access off William Roberts Road. The parking area will provide 21 additional parking spaces (24 in total, however three spaces are displaced). The proposed layout is shown in **Figure 118**.


**Figure 118: William Roberts Rd south parking loss mitigation**

The proposed parking area will be located near the new raised pedestrian crossing on William Roberts Road, connecting the proposed parking area with the existing footpaths on the western side of the carriageway. The proposed parking area will mitigate the effects on parking in Open Spaced zoned land along William Roberts Road south.

Stakeholder engagement is ongoing with Auckland Council to develop this option as well as relocating the existing playground to provide the necessary space for the proposed carpark.

#### 6.6.3 EB2 – Pakuranga Road

In the proposed design, the kerbside lanes along Pakuranga Road between Ti Rakau Drive and the RRF will be converted to unidirectional cycleways. As such, no on-street parking will be provided along this section of Pakuranga Road in the future. Intermittent gaps will be provided in the buffer islands to allow for drainage to catchpits, but also to allow vehicular access to all properties with access off Pakuranga Road, similar to the existing environment (see **Figure 119** below).

As noted above, Pakuranga Road is largely similar to Ti Rakau Drive in the EB3R project area, in terms of traffic volumes and operating speeds, and so it is not unreasonable to assume that Pakuranga Road experiences the same low level of parking utilisation in the existing environment during weekdays and weekends. Based on this assumption, the permanent effects on on-street parking are expected to be negligible.

The majority of the clearway sections along Pakuranga Road, east of the existing William Roberts Road intersection (see **Section 5.5.4**), will be retained upon completion of the Pakuranga Road / RRF tie-in.

##### *6.6.3.1 141 Pakuranga Road (GAS Service Station)*

In the future, access from Pakuranga Road to the property at 141 Pakuranga Road will be largely similar to the existing environment. The proposed design will provide unidirectional cycleways in the kerbside lanes on Pakuranga Road, as well as buffer islands to separate the cycleways and the general traffic running lanes.

As above, intermittent gaps will be provided in the buffer islands to allow for drainage to catchpits, but also to allow vehicular access to this property, similar to the existing environment. **Figure 119** below shows the location of 141 Pakuranga Road (blue outline) and the proposed design along Pakuranga Road.

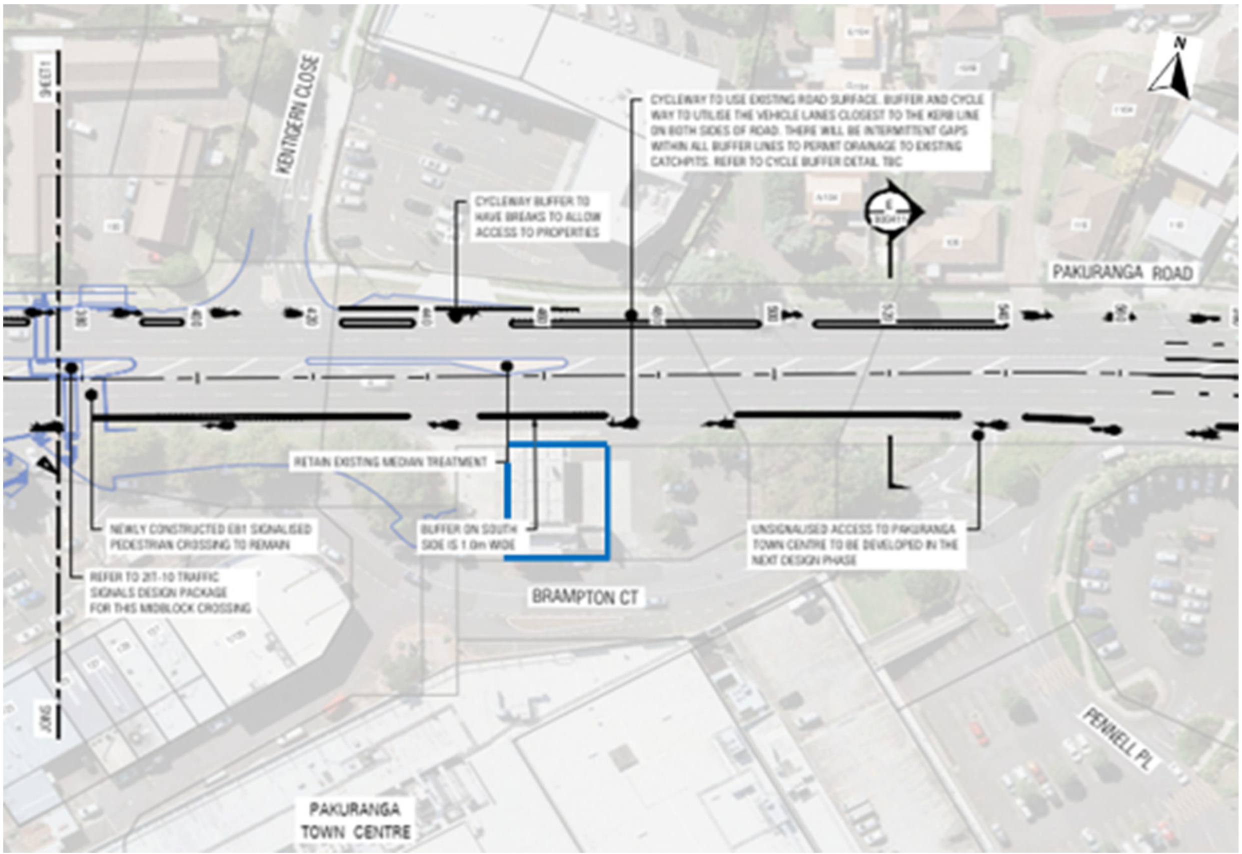



**Figure 119: 141 Pakuranga Road (blue outline) upon completion**

### 6.6.4 EB2 – Ti Rakau Drive, Side Roads and Properties

#### *6.6.4.1 Ti Rakau Drive*

The proposed design of Ti Rakau Drive in the EB2 project area, between Pakuranga Road and Reeves Road does not provide any on-street parking. However, no on-street parking is provided in the existing environment. Therefore, the proposed design will have no effects on on-street parking.

As per the existing environment, left-in/left-out access to the residential properties (3-27 Ti Rakau Drive) on the western side of the carriageway will be maintained. Upon completion, residents of these properties will no longer be able to use the existing U-turn facility on Ti Rakau Drive to head east. However, vehicles will still be able to turn right into Pakuranga Road and Brampton Court to execute a U-turn manoeuvre if required to head east along Ti Rakau Drive. Therefore, the permanent effects to these residential properties are considered to be very low.

#### *6.6.4.2 Side Roads*

Upon completion of the new Ti Rakau Drive / Aylesbury Street / Palm Avenue crossroads intersection, a raised table will be provided on the Palm Avenue approach, with no effect on property access. No on-street parking is allowed on this section of Palm Avenue in the existing environment. Therefore, the final design will have no effects on on-street parking and property access along Palm Avenue.

#### 6.6.4.3 Pakuranga Plaza

**Property Access:**

Upon completion of construction, the Plaza will be served by six access points in total including:

- Reeves Road / Cortina Place / Private Access Road intersection (unsignalised)
- The undercover carpark access off Reeves Road
- Reeves Road / Aylesbury Street intersection (signalised)
- Ti Rakau Drive / Aylesbury Street / Palm Avenue intersection (signalised)
- Pakuranga Road / Brampton Court intersection (unsignalised)
- The Pepler Street exit onto Pakuranga Road

The two existing Aylesbury Street accesses off Ti Rakau Drive will be combined into one crossroads intersection with Palm Avenue and will be signalised. Although the total number of access points to the Plaza will be reduced by one compared to the existing environment, it is expected that the signalisation of two accesses will lead to an overall improvement in capacity and vehicle access to Pakuranga Plaza.

**Parking:**

Overall, the proposed design will result in the permanent loss of 257 of the 1,355 parking spaces at the Pakuranga Plaza. However, parking survey data showed that utilisation does not exceed 60% on an average weekday or weekend. As such, it is expected that the Plaza would still have 285 unoccupied parking spaces upon completion of construction. Therefore, the permanent effects of the proposed design on parking at the Pakuranga Plaza are considered to be negligible.

**Figure 120** below shows the Pakuranga Plaza and the proposed design of the surrounding roads.

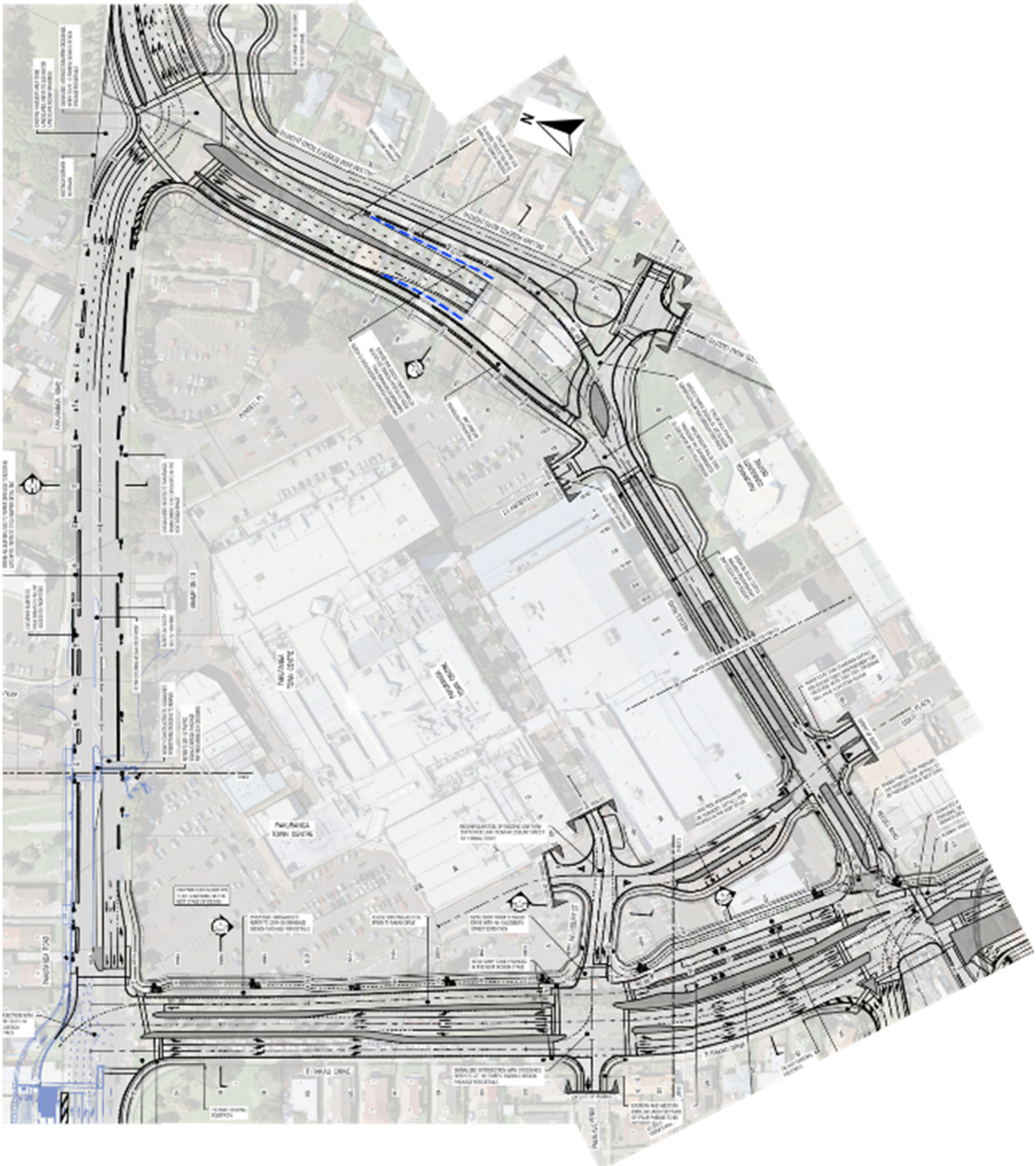


**Figure 120: Pakuranga Plaza upon completion**

#### 6.6.4.4 26 Ti Rakau Drive

Upon completion of construction, 26 Ti Rakau Drive will be significantly redeveloped. A bus station will be provided between Aylesbury Street and Reeves Road, and a 'Kiss-and-Ride' facility will be provided on the private access road off Aylesbury Street that will consist of six parking spaces. Scooter and bike parking facilities will also be provided near the bus station. The remainder of 26 Ti Rakau Drive will be developed into open space, to improve amenity around the bus station (see **Figure 121**).

**Figure 121: 26 Ti Rakau Dr artistic representation upon completion**

### 6.6.5 EB3R – Ti Rakau Drive, Side Roads and Properties

#### *6.6.5.1 Ti Rakau Drive*

The proposed design of Ti Rakau Drive in the EB3R project area will provide online bus lanes along the centre of the carriageway, from Reeves Road to Gossamer Drive. In addition, unidirectional cycleways will be provided on both sides of Ti Rakau Drive. The cycleway on the northern side of the carriageway will be provided in the existing eastbound kerbside / parking lane and will be separated from the adjacent general traffic lanes by a buffer island. The cycleway on the southern side of Ti Rakau Drive will be separated from the general traffic running lanes by a grass berm. The proposed EB3R design of Ti Rakau Drive will provide no on-street parking between Reeves Road and Gossamer Drive.

However, as stated in **Section 3.7.4**, the average utilization of the existing on-street parking is poor with only 3% occupancy on weekdays and 8% on Saturdays. This is not unexpected as this high-volume road does not create an appealing location to park vehicles and is likely leading to a high perceived risk of crashes. Furthermore, the acquisition of the majority of the residential properties on the southern frontage of Ti Rakau Drive will remove the need for on-street parking along this section.

The current left-in/left-out access arrangements to the remaining properties on both sides of Ti Rakau Drive will be maintained upon completion. Access to these properties from the opposite side of Ti Rakau Drive will be facilitated by the new U-turn facilities along the corridor as well as the U-turn manoeuvre provide at the Ti Rakau Drive / Gossamer Drive intersection. Therefore, the permanent effects on property access and on-street parking are considered to be negligible.

#### *6.6.5.2 Side Roads*

**Tiraumea Drive, Roseburn Place, Edgewater Drive and Wheatley Avenue:**

Changes along the side roads of Tiraumea Drive, Roseburn Place, Edgewater Drive west, Wheatley Avenue and Edgewater Drive east as a result of the proposed design will be limited to the approaches of the intersections with Ti Rakau Drive. As such, permanent effects on on-street parking and property access along these side roads are considered to be negligible.

**Marriott Road and Chevis Place:**

No changes are proposed along Marriott Road and Chevis Place. Therefore, the proposed design will have no permanent effects on on-street parking and property access along these side roads.

**Mattson Road:**

The proposed design along Mattson Road is relatively more extensive. The Mattson Road approach will be set back approximately 40 m south and 25 m east of its current location where it intersects Ti Rakau Drive. This will provide space for the new westbound lanes on Ti Rakau Drive and will provide sufficient midblock stacking space between the intersections at Mattson Road and William Roberts Road.

However, the properties on the southern side of Ti Rakau Drive have been acquired, removing the need for on-street parking. Accesses to properties along Mattson Road not acquired by AT will be maintained and will interface with the new alignment of Mattson Road similar to the existing environment. Therefore, the permanent effects on on-street parking and property access along Mattson Road are considered to be negligible.

**Gossamer Drive:**

In the proposed design, the Gossamer Drive approach limit line will be set back approximately 15 m from its current location and the kerbside exit lane will be extended to 100 m. NSAAT line markings are currently provided on the eastern side of the road up to the bus stop near the intersection with Riverhills Avenue. These markings will be replicated on the western side of the road. This will result in the loss of on-street parking in front of 169, 171, 173 and 175 Gossamer Drive. It is likely that these properties have sufficient off-street parking, and that on-street parking is not occupied on a regular basis. Accesses to properties along Gossamer Drive not acquired by AT will be maintained and will interface with the roadway similar to the existing environment. Therefore, the permanent effects on on-street parking and property access along Gossamer Drive are considered to be negligible.

**Freemantle Place:**

The Freemantle Place approach will be set back approximately 11 m. NSAAT line markings are provided on the western side of the road for approximately 31 m from the limit line. The line markings will be reinstated upon completion and will result in the loss of one parking space in front of 3 Freemantle Place. The existing line markings on the eastern side of the road will be retained. Property access along Freemantle Place will be maintained as per the existing environment. Therefore, the permanent effects on on-street parking and property access along Freemantle Place are considered to be negligible.

#### *6.6.5.3 Residential Properties on Southern Frontage of Ti Rakau Drive*

Upon completion of the new westbound lanes on Ti Rakau Drive in EB3R, the temporary residential access tracks at 75A, 83, 83A-C, 87-91, 97, 103A, 129, 145, 175A, 177, 183-185 and 191 Ti Rakau Drive will be disestablished. Residents will be able to use their existing driveways off the new Ti Rakau Drive westbound lanes. The accesses will be left-in/left-out only, similar to the existing environment. Therefore, permanent effects to property access at these properties are considered to be negligible.

#### *6.6.5.4 107 and 109 Ti Rakau Drive – Edgewater Shops*

Upon completion, the temporary carpark at 105 Ti Rakau Drive will be made permanent. The carpark will provide 22 parking spaces. Access to and from the proposed carpark will be via Ti Rakau Drive, similar to the existing environment (see **Figure 122** below). Access to the refuse collection area to the rear of the property will be largely similar to the existing environment. Therefore, the effects of the proposed carpark on property access and parking are considered to be negligible.


**Figure 122: Edgewater Shops proposed parking area upon completion**

### *6.6.5.5 32 Edgewater Drive – Edgewater College*

In the existing environment, Edgewater College is accessed from both the Edgewater Drive west and east intersections with Ti Rakau Drive, which provide for all movements in and out. The proposed design of the Ti Rakau Drive / Edgewater Drive west and east intersections is left-in left-out only.

As stated in **Section 4.2.2.2**, a U-turn facility will be provided between Edgewater Drive west and Wheatley Avenue which will enable eastbound traffic on Ti Rakau Drive to execute a U-turn manoeuvre and turn into Edgewater Drive west. Furthermore, a U-turn manoeuvre will also be provided on the western approach at the Ti Rakau Drive / Gossamer Drive intersection. This will enable eastbound traffic on Ti Rakau Drive to execute a U-turn and turn into Edgewater Drive east.

Overall, permanent effects to property access at Edgewater College are considered to be negligible. Permanent effects to school bus services to and from Edgewater College are assessed in **Section 6.4.8**.

### *6.6.5.6 207, 219 and 229 Ti Rakau Drive – Pakuranga Baptist Church*

Access from Ti Rakau to the property at 207 Ti Rakau Drive (Pakuranga Counselling Centre) will not be maintained in the future. However, the property will still be accessible from Freemantle Place. Therefore, permanent effects to property access are considered to be very low. **Figure 123** below shows the location of 207 Ti Rakau Drive (blue outline) and the proposed design of the adjacent roads.

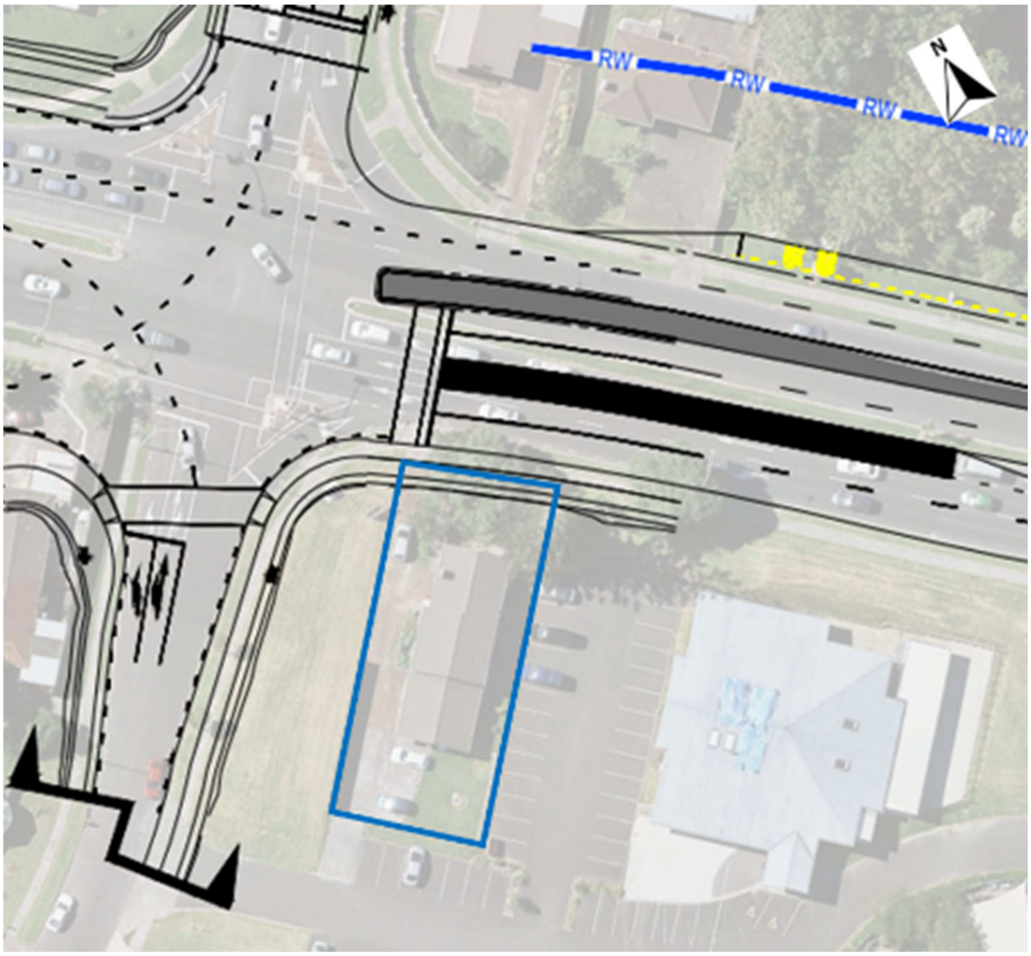



**Figure 123: 207 Ti Rakau Drive (blue outline) upon completion**

No changes to property access or parking are proposed at 209 and 229 Ti Rakau Drive in the proposed design. Access to these properties will be maintained as per the existing environment.

#### *6.6.5.7 168R Gossamer Drive – River Hills Park*

As stated in **Section 5.5.6.7**, a parcel of land along the southern boundary of 168R Ti Rakau Drive River Hills Park has been acquired to allow for the eastbound Gossamer Drive bus station. Discussions are ongoing with the Council as well as the Fencibles United Football Club on the rearrangement of the fields on the property as a result of the Project. **Figure 124** below shows the proposed field rearrangements at the River Hills Park.

**Figure 124: 168R Gossamer Drive upon completion**

However, from a transport perspective, the Project will have no permanent effects to property access and parking on-site.

## 6.7 Effects to Safety Performance

The sections below discuss the potential effects on safety performance in the context of EB2 and EB3R upon completion.

A Safe Systems Assessment (SSA) was undertaken of the proposed EB2 and EB3R design layouts. As stated in **Section 3.8.2**, the SSA was conducted in accordance with the Auckland Transport Safe System Assessment Guidelines which are based on the Austroads 2016, Research Report AP-R509-16, Safe System Assessment Framework. The above-mentioned report section also provides details on the types of crashes assessed as well as the SSA framework. A summary of the findings is presented below.

### 6.7.1 EB2

**Table 46** provides an assessment summary and comparison of the SSA of the existing environment and the proposed design of EB2. Again, each crash type is scored based on exposure, likelihood and severity and a lower score corresponds with a safer system. It should be noted that Location A in EB2 indicates the location of the bus station upon completion of the Project.

**Table 46: EB2 SSA – existing vs future environment**

| ZONE EB2 ASSESSMENT SUMMARY | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| EXISTING LAYOUT | R-O-R | H-O | INT | OTHER | M/C | P1 | P2 | P3 | C1 | C2 | TOTAL |
| A) PAKURANGA EB STATION | 16 | 16 | 32 | 16 | 64 | 24 | 48 | 0 | 36 | 36 | 288 |
| B) TI RAKAU DR / PALM AVE | 16 | 16 | 32 | 16 | 48 | 24 | 0 | 48 | 36 | 36 | 272 |
| C) TI RAKAU DR / REEVES RD | 16 | 16 | 24 | 16 | 48 | 18 | 0 | 24 | 36 | 27 | 225 |
| D) TI RAKAU DR / TIRAUMEA DR | 8 | 16 | 16 | 24 | 48 | 24 | 48 | 0 | 31.5 | 27 | 242.5 |
| E) TI RAKAU DR / MATTSON RD | 16 | 16 | 24 | 24 | 48 | 18 | 48 | 36 | 31.5 | 27 | 288.5 |
| F) PAKURANGA RD / TI RAKAU DR | 16 | 16 | 24 | 16 | 48 | 12 | 0 | 24 | 36 | 36 | 228 |
| G) PAKURANGA RD / REEVES RD | 16 | 24 | 32 | 16 | 64 | 18 | 0 | 48 | 36 | 36 | 290 |
| H) REEVES RD FLYOVER | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DESIGN LAYOUT | R-O-R | H-O | INT | OTHER | M/C | P1 | P2 | P3 | C1 | C2 | TOTAL |
| A) PAKURANGA EB STATION | 12 | 12 | 0 | 12 | 32 | 0 | 64 | 0 | 30 | 0 | 162 |
| B) TI RAKAU DR / PALM AVE | 12 | 12 | 18 | 12 | 48 | 24 | 0 | 48 | 30 | 20 | 224 |
| C) TI RAKAU DR / REEVES RD | 12 | 12 | 24 | 12 | 48 | 24 | 0 | 48 | 30 | 30 | 240 |
| D) TI RAKAU DR / TIRAUMEA DR | 6 | 6 | 12 | 18 | 48 | 16 | 64 | 0 | 20 | 30 | 220 |
| E) TI RAKAU DR / MATTSON RD | 12 | 6 | 18 | 24 | 48 | 16 | 48 | 48 | 20 | 30 | 270 |
| F) PAKURANGA RD / TI RAKAU DR | 12 | 12 | 18 | 12 | 48 | 16 | 0 | 32 | 20 | 20 | 190 |
| G) PAKURANGA RD / REEVES RD | 18 | 12 | 12 | 12 | 32 | 16 | 0 | 32 | 48 | 48 | 230 |
| H) REEVES RD FLYOVER | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Although the product score for P2 type crashes (midblock crossings) is slightly increased, the total score of Location A is significantly reduced. The score increase for P2 type crashes is due to the expected increase in pedestrian movements to and from the bus station, therefore having a slightly higher exposure.

The total score of Location C is slightly higher in the proposed design, compared to the existing environment. The product score of pedestrian crashes (P1 and P3) is slightly increased due to the higher number of pedestrian crossings. The product score for P2 type crashes is slightly increased at Location D. This is due to the increase in the number of pedestrian crossings (higher exposure). However, the total score is reduced.

Overall, the proposed design of EB2 is a balance between the competing modes of travel. The proposed design will provide staged crossings at various locations in order to reduce pedestrian delay, improve safety and discourage jaywalking. Overall, the product score of the proposed design is lower throughout EB2 compared to the existing environment.

### 6.7.2 EB3R

**Table 47** below provides an assessment summary and comparison of the SSA of the existing environment and the proposed design of EB3R. It should be noted that Location F and H in EB3R indicate the locations of the bus stations upon completion of the Project.

**Table 47: EB3R SSA – existing vs future environment**

| ZONE EB3R ASSESSMENT SUMMARY | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| EXISTING LAYOUT | R-O-R | H-O | INT | OTHER | M/C | P1 | P2 | P3 | C1 | C2 | TOTAL |
| A) ROSEBURN PL | 8 | 16 | 32 | 24 | 64 | 24 | 48 | 0 | 27 | 36 | 279 |
| B) MARRIOTT RD | 8 | 16 | 32 | 24 | 64 | 24 | 48 | 0 | 27 | 36 | 279 |
| C) EDGEWATER DR / CHEVIS PL | 8 | 16 | 16 | 24 | 48 | 24 | 48 | 24 | 27 | 27 | 262 |
| D) WHEATLY AVE | 8 | 16 | 32 | 24 | 64 | 24 | 36 | 0 | 27 | 36 | 267 |
| E) EDGEWATER DR | 8 | 0 | 32 | 24 | 64 | 24 | 0 | 0 | 27 | 36 | 215 |
| F) GOSSAMER STATION WB | 8 | 0 | 0 | 24 | 32 | 0 | 0 | 0 | 27 | 18 | 109 |
| G) GOSSAMER DR INTERSECTION | 24 | 24 | 24 | 24 | 48 | 18 | 0 | 36 | 36 | 18 | 252 |
| H) GOSSAMER STASTION EB | 8 | 16 | 0 | 8 | 16 | 0 | 32 | 0 | 36 | 0 | 116 |
| DESIGN LAYOUT | R-O-R | H-O | INT | OTHER | M/C | P1 | P2 | P3 | C1 | C2 | TOTAL |
| A) ROSEBURN PL | 6 | 6 | 12 | 18 | 48 | 8 | 64 | 0 | 20 | 30 | 212 |
| B) MARRIOTT RD | 6 | 6 | 12 | 24 | 48 | 8 | 64 | 0 | 20 | 30 | 218 |
| C) EDGEWATER DR / CHEVIS PL | 6 | 6 | 12 | 24 | 48 | 8 | 64 | 0 | 20 | 30 | 218 |
| D) WHEATLY AVE | 6 | 6 | 12 | 18 | 48 | 8 | 48 | 0 | 20 | 30 | 196 |
| E) EDGEWATER DR | 6 | 0 | 12 | 18 | 48 | 8 | 0 | 0 | 20 | 30 | 142 |
| F) GOSSAMER STATION WB | 6 | 6 | 0 | 24 | 32 | 0 | 64 | 0 | 20 | 20 | 172 |
| G) GOSSAMER DR INTERSECTION | 18 | 24 | 24 | 24 | 64 | 24 | 0 | 64 | 30 | 40 | 312 |
| H) GOSSAMER STASTION EB | 6 | 12 | 0 | 6 | 16 | 0 | 48 | 0 | 20 | 0 | 108 |

Although the total scores for Locations A, B and C are significantly reduced, the product score for P2 type crashes is slightly increased. This is due to the expected increase in pedestrian movements and slight increase in likelihood of pedestrians rushing to the bus station.

The total score of Location F is slightly increased, compared to the existing environment. Similar to the above, this is due to the expected increase in pedestrian movements and slight increase in likelihood of pedestrians rushing to the bus station.

The proposed design of the Ti Rakau Drive / Gossamer Drive intersection has a higher total score. This is due to the complexity and unfamiliarity of the intersection compared to the existing environment. However, the intersection design will be in line with all relevant TDM design provisions and guidance to ensure safety.

As above, the proposed design will provide staged crossings at various locations in order to reduce pedestrian delay, improve safety and discourage jaywalking. Overall, the product score of the proposed design is lower throughout EB3R compared to the existing environment.

# 7 Mitigation Summary

The sections below provide a summary of the mitigation measures proposed in this ITA to mitigate the potential adverse effects of the Project both during construction and upon completion.

## 7.1 Mitigation Measures during Construction

The mitigation measures to be employed during construction will form part of the conditions of the CTMP.

### 7.1.1 Construction Support Areas

- The properties at 2 Cortina Place and 5 Reeves Road will serve as site offices for the Project. It is envisaged that, at least for the initial year of construction, site office staff will use public transport for commuter trips and will access the site offices on foot. Workforce Travel Management Plans will be developed to reduce the number of private vehicles travelling to the worksites and to increase the accessibility of the worksites through more travel options. Following the initial year and as construction activities ramp up, a staff carpark will be provided at 26 Ti Rakau Drive.

- The operation and movement of the Gantry at the Pennell Place CSA will be under strict construction traffic management control. Advance notice and appropriate public communication of such infrequent activities will be undertaken prior to these being initiated. This will be achieved through the Construction Traffic Management Plan (CTMP).

- During the operation of the William Roberts Road north construction yard, it is proposed that the Pakuranga Road / William Roberts Road intersection will be signalised temporarily. This will improve the capacity of the right-turn movements into and out of William Roberts Road and improve the safety of turning across three lanes of through traffic.

### 7.1.2 Hours of Operation

- It is anticipated that some night works will be undertaken to minimise the disruption to the public, businesses and traffic. Night works will be intermittent, and will not be continuous in a single location or activity. These works will be controlled in part by the Project's consent conditions and management plans, including the Construction Noise and Vibration Management Plan (CNVMP).

### 7.1.3 Construction Vehicles and Routes

- Community engagement will be undertaken to raise awareness of the increase in construction vehicles that will pass through William Roberts Road south and Reeves Road due to the increase in exposure to some vulnerable users in the area. Construction vehicle drivers will also be briefed on these properties so that additional caution is employed when driving through these areas. This will be achieved through the CTMP.

### 7.1.4 General Traffic

- To mitigate the potential adverse effects to travel times during Construction Scenario 1 and 2, appropriate public communication and advance warning of the planned works will be undertaken prior to the works being initiated. Public communication and signage will also be provided during construction informing motorists of the works and potential delays, which would lead to changes in travel behaviour such as travelling outside the peak periods or using alternative routes. This will be achieved through the CTMP.

- The construction of the Ti Rakau Drive / Reeves Road / SEART intersection (underneath the RRF) and the Ti Rakau Drive / Gossamer Drive intersection are considered the final major changes to the transport network (Construction Scenario 3). To mitigate the adverse effects, these activities will be undertaken during a low traffic period, such as December-January. Extensive community engagement will be undertaken well in advance of the planned works and will include notices of the planned works, dates of construction, messaging to avoid the areas where disruption is anticipated and alternative routes. This will be achieved through the CTMP.

- To mitigate the temporary effects to general traffic on Pakuranga Road during the crossing draining works east of the Pakuranga Road / Ti Rakau Drive intersection, the signalised midblock pedestrian crossing will be disabled temporarily. This will mitigate upstream queues through the Pakuranga Road / Ti Rakau Drive intersection during the lane closures.

- A temporary traffic signal will be provided at the Ti Rakau Drive / Edgewater Drive east intersection during the construction of the Ti Rakau Drive / Edgewater Drive west intersection. This will ensure that signalised movements for vehicles turning into and out of Edgewater Drive are maintained.

### 7.1.5 Bus Services and Facilities

- During the closure of Reeves Road, the 711 outbound (eastbound) service will be diverted temporarily to the newly completed WRRE.

- Once William Roberts Road north is closed, the 711 inbound (westbound) service will also be diverted to the WRRE and will utilise bus stop (ID 6127) to pick-up/drop-off passengers at the Pakuranga Plaza.

- Opportunities will be explored during the development of the CTMP to improve bus travel times during Construction Scenario 1. Appropriate public communication and advance warning of the planned works will be undertaken prior to the works being initiated. Public communication and signage will also be provided during construction informing motorists of the works and potential delays, which could lead to changes in travel behaviour such as travelling outside the peak periods or using alternative routes.

### 7.1.6 Pedestrians and Cyclists

- Pedestrian crossings and footpaths will be maintained at all times during construction. Should this be unachievable, temporary facilities will be provided to ensure pedestrian connectivity. This will be ensured through the CTMP.

### 7.1.7 Property Access and Parking

- Access from Reeves Road to the Gull Service Station at 3 Reeves Road will not be maintained during the Reeves Road closure. Discussions regarding compensation are ongoing with the owner regarding loss of direct road access onto Reeves Road as part of the Public Works Act process.

- During the Reeves Road closure, a temporary two-way access will be provided from Cortina Place to the Eastside Pups Dog Grooming and Daycare at 11 Reeves Road.

- Access to The Warehouse's goods entrance at 7 Aylesbury Street and the service entrance to the Pakuranga Library and Citizens Advice Bureau at 2R Ti Rakau Drive will be maintained through the work site. Removable barriers will be installed in the median and the existing masonry wall on the property boundary will be removed, if required, and will be re-installed following construction.

- During the Reeves Road closure, the main access to Te Tuhi at 13R Reeves Road will be closed and a temporary drop-off area with a temporary walkway leading to the main entrance will be provided on William Roberts Road.

- Access to the GAS Service Station at 141 Pakuranga Road and the Pakuranga Plaza via Brampton Court will be maintained during the longitudinal drainage works on Pakuranga Road by completing the works in sections and via steel plating across the trenches. The construction team will also liaise with the operators of the service station to ensure sufficient access widths are provided, as and when required, for fuel delivery tankers.

- During Phase 1 of Ti Rakau Drive in EB3R, the remaining properties on the southern frontage will not have access to Ti Rakau Drive while the westbound lanes are constructed. Temporary residential access will therefore be provided during this phase via chip seal access tracks along the back of the acquired properties accessed through side streets. Properties that would use these access tracks include 75, 83, 83A-C, 87, 98, 91, 97, 103A, 129, 145, 175A, 177, 183, 185 and 191 Ti Rakau Drive.

- A temporary parking area, with 18 parking spaces, will be provided at 105 Ti Rakau Drive for the Edgewater Shops located at 107 and 109 Ti Rakau Drive during construction. The temporary carpark will be accessed via Edgewater Drive west and the access road to the rear of the commercial buildings. Temporary signage will be provided to direct customers.

- To mitigate the effects on the school bus services serving Edgewater College, two mitigation measures are proposed to be consulted on with the Ministry of Education and the school. The first option would be a temporary rearrangement of the off-street parking area to enable buses to perform a U-turn manoeuvre. The second option would be to utilise the existing bus stops on Ti Rakau Drive. From a transport perspective, either option would be manageable.

- Drainage works at 207, 219 and 229 Ti Rakau Drive will be undertaken in sections to maintain vehicle access to all properties at all times. Furthermore, at the end of the work week, the work zone will be reduced in size, while maintaining safety, to free up as many occupied parking spaces as possible.

## 7.2 Mitigation Measures upon Completion

- Access to the Gull Service Station at 3 Reeves Road will not be maintained from Reeves Road. Discussions regarding compensation are ongoing with the owner regarding the loss of direct road access from Reeves Road as part of the Public Works Act process.
- To mitigate the loss of 16 parking spaces located within the Open Space zoned land along William Roberts Road south an off-street parking area will be provided in Ti Rakau Park providing 21 additional parking spaces. Stakeholder engagement is ongoing with Auckland Council to develop this option as well as relocating the existing playground to provide the necessary space for the proposed carpark.
- To mitigate the removal of the parking spaces at the Edgewater Shops (107 and 109 Ti Rakau Drive), the temporary carpark at 105 Ti Rakau Drive will be made permanent and will provide 22 parking spaces.
- Discussions are ongoing with Council and Fencibles United Football Club to rearrange the fields on River Hills Park as a result of the parcel of land that has been acquired along the southern boundary of 168R Ti Rakau Drive to facilitate the eastbound Gossamer Drive bus station.

# 8 Conclusions

Overall, the temporary effects of the various CSAs as well as the construction traffic in the project areas will be mitigated appropriately and are considered to be negligible or very low. Workforce Travel Management Plans will be developed to reduce private vehicle trips and to increase worksite accessibility through more travel options. CTMPs will be developed to avoid, remedy or mitigate the adverse effects of construction on transport, parking and property access so far as is reasonably practicable. The CTMPs will be developed in accordance with the conditions of consent and will include management strategies, controls and reporting protocols to achieve this. Hours of operation, especially night works, will be controlled in part by the Project's consent conditions and management plans, including the CNVMP.

Overall, the temporary effects on intersection performance during all construction scenarios across the network are considered to be negligible or very low. Some works are proposed to be undertaken during a low traffic period (December-January) to mitigate the potential effects of disruption. Appropriate measures have been proposed to support the operation of the construction yard, as well as during drainage works on Pakuranga Road and works on the Edgewater Drive loop.

Although the temporary effects to intersection performance during construction are predicted to be negligible or very low, some adverse effects to general traffic and bus travel times are expected, particularly during Construction Scenario 1[41]. These effects are not unexpected due to the number of ongoing construction activities. It should be noted that these effects are temporary, and once constructed, the RRF and EB2/EB3R as a whole will alleviate congestion, particularly around the Pakuranga Town Centre. Nevertheless, to mitigate these effects, appropriate public communication and advanced warning of the planned works will be undertaken prior to the works being initiated. Also, opportunities to improve bus travel times will be explored in the development of the CTMPs. Public communication and signage will also be provided during construction informing motorists of the works and potential delays, which would lead to changes in travel behaviour such as travelling outside the peak periods or using alternative routes.

Temporary effects to pedestrian and cyclists during construction are considered to be negligible overall. Pedestrian crossings and footpaths will be maintained at all times during construction. Should this be unachievable, temporary facilities and diversions will be provided to ensure pedestrian connectivity.

Overall, the temporary effects during construction on property access and parking will be mitigated appropriately and are considered to be negligible or very low. Where existing vehicle access arrangements and parking provisions cannot be maintained, appropriate mitigation measures have been proposed to provide levels of access and parking commensurate with the existing environment as far as is reasonably practicable.

Engagement with property owners or operators will be undertaken during construction to communicate the planned works and duration, the potential disruption and proposed mitigation measures as well as to develop additional measures or improve upon proposed measures if required. Lastly, pedestrian access to properties will be maintained at all times. This will be ensured through the CTMPs.

[41] Construction Scenario 1 simulates the closure of Reeves Road as well as the ongoing construction of the RRF (i.e., not constructed yet).

Safety measures will be in place during construction, ensured by the CTMPs. The safety and protection of the public, traffic and construction team is paramount, and all site operations will be focused on zero harm to all involved, associated with and traveling through the project areas.

In the existing environment, Auckland's eastern suburbs are experiencing a range of transport related problems and challenges. The completion of EB2 and EB3R will improve upon these shortcomings through the following:

- Significantly improved travel options for all modes of transport
- Increased public transport patronage and mode share through increased catchment and dedicated bus lanes
- Reduced carbon emissions
- Improved walking and cycling amenity and safety through dedicated infrastructure
- Reduced congestion, particularly around the Pakuranga Town Centre, through the new Reeves Road flyover

The main elements of the proposed design of EB2 and EB3R include dedicated bus lanes along Ti Rakau Drive, connecting to the EB1 bus lanes at Pakuranga Road and terminating at Gossamer Drive, as well as three new bus stations along the corridor. A new link between Pakuranga Road and SEART in the form of the Reeves Road Flyover (RRF). Dedicated cycleways on Pakuranga Road, between Ti Rakau Drive and the RRF, and along Ti Rakau Drive from Pakuranga Road to Gossamer Drive.

In the future, the Ti Rakau Drive and Pakuranga Road corridors will have more strategic Place functions, in addition to the Movement of people and goods. The proposed Eastern Busway bus stations will also attract more people within the area as the activities served by these bus stations will become local attractions. Modal priority of pedestrians, cyclists and buses will be improved, and as a result modal priority of general traffic and parking will decrease across the project areas.

Overall, the proposed design of EB2 and EB3R is expected to lead to acceptable operations for general traffic across the network, and importantly, bus movements are predicted to operate at LOS C and with spare capacity. The RRF is expected to relieve congestion around the Pakuranga Town Centre by removing traffic from Ti Rakau Drive and providing a direct and faster link between Pakuranga Road and SEART. Furthermore, significant improvements in travel times are expected overall, especially from Botany towards Pakuranga and SEART.

Benefits of the new stations will be the ability to support significantly higher public transport patronage through increased catchment and higher service frequencies through increased capacity. These benefits, in combination with improved customer accessibility, amenity and safety, will lead to an increase in mode share of public transport. A particular benefit of the Pakuranga Town Centre bus station will be the integration of all bus services in the EB2 and EB3R project areas, which will provide an improved transfer experience for passengers. Another benefit of the stations will be improved safety for buses.

EB2 and EB3R are predicted to result in a significant increase in public transport patronage in the future. As such, bus station platforms and loading areas have been designed to provide appropriate levels of service and capacity to support this uptake in public transport. Along with this, bus service headways, reliability and efficiency will also be improved overall. The combination of these public transport upgrades is expected to significantly increase public transport mode share, which in turn will reduce congestion and reduce greenhouse gas emissions by way of a more sustainable movement of people through the network. Overall, the proposed design is predicted to improve bus travel times across the network. The combination of improved travel times and higher service frequencies will lead to faster and more reliable public transport trips.

The Project will provide dedicated footpaths and cycleways to improve pedestrian and cyclist amenity and safety. Providing dedicated cycleways will create a physically separated and safe space that facilitates cycle movements through the network, which will provide users with a more attractive mode of travel and supports the uptake of cycling. Furthermore, the cycleways will facilitate improved accessibility to the bus stations, resulting in increased catchment as well as the potential for mode shift to occur, increasing uptake of public transport across the network.

Lastly, the proposed design of EB2 and EB3R will provide an overall safer transport system for all modes of transport through the project areas with the aim to reduce fatal and serious injury crashes. The proposed design will provide staged crossings at various locations in order to reduce pedestrian delay, improve safety and discourage jaywalking. Raised pedestrian platforms will also be provided to create a low-speed environment, and to aid pedestrians and cyclists by simplifying the crossing task. Furthermore, these facilities will increase visibility by creating a visual cue for drivers to reduce their speed as they approach, and encourage courtesy between drivers and pedestrians.

In conclusion, with the proposed mitigation measures in place, the potential adverse effects during construction and upon completion of EB2 and EB3R are considered to be negligible or very low. Furthermore, the proposed design is predicted to result in significant improvements and a range of benefits overall.

# Appendix A

**Reeves Road Closure Detour Assessment**

Eastern Busway Alliance

# Technical Advice Memorandum

| | | | |
|---|---|---|---|
| To | Josie Jackson, Andy Gibbard, Julio Marti Herraiz, Ben Burrows | Page | 1 of 27 |
| CC | Jacques Van den Heever, Christine Lee, Josie Ackroyd | | |
| Subject | AMETI Eastern Busway<br><br>Stage 2 Reeves Road Closure & Detour Assessment - DRAFT | | |
| From | Shane Doran | | |
| File/Ref No. EBQ-TA-Z1-TM-0001-01 | | Date | 03-Sep-2021 |

## Summary

- Overall, it seems that only a small percentage of traffic is routing along the proposed detour route (probably due to the already congested nature of those intersections).
- As a result, in the **inbound** (citybound) direction during the AM demand seems to detour via Gossamer Road to Pakuranga Road in the north and Ti Rakau Drive in the south.
- In the PM in the **outbound** direction, demand seems to return via Pakuranga Road, and via SEART turning right onto Ti Rakau Drive.
- NOTE: Colour-coding of the tables below are in reference to the Do-Minimum scenario with green = improved, amber = similar and red = worse.

**William Roberts Road / Reeves Road intersection:**

- For the Stage 2 detour this intersection is expected to operate with good LOS in the AM and PM.

| Scenario | LOS | | DOS [v/c] | | Average Delay [sec] | |
|---|---|---|---|---|---|---|
| | AM | PM | AM | PM | AM | PM |
| Do-Minimum | - | - | 0.68 | 0.87 | 8 | 12 |
| Stage 2 Detour | - | - | 0.18 | 0.39 | 5 | 5 |

**William Roberts Road / Pakuranga Road intersection:**

- The assessment indicates that the Stage 2 detour results in overall intersection performance that is similar or worse than the Do-Minimum in the AM and PM, but in practical terms the intersection is already saturated, and the impact of the detour is considered negligible.

| Scenario | LOS | | DOS [v/c] | | Average Delay [sec] | |
|---|---|---|---|---|---|---|
| | AM | PM | AM | PM | AM | PM |
| Do-Minimum | - | - | 9.46 | 32.92 | 387 | 2260 |
| Stage 2 Detour | - | - | 10.96 | 19.93 | 443 | 1011 |

**Pakuranga Road / Ti Rakau Drive intersection:**

- Stage 2 intersection performance is LOS D during the AM peak, with the Ti Rakau Drive west left-turn lane expected to operate at LOS C.
- During the PM peak the intersection is expected to perform at LOS F during Stage 2, compared to the LOS E of the Do-Minimum scenario. Demand seems to have increased on Pakuranga Road west (and east), however the west approach is already saturated, causing delays to increase further.
- NOTE: The Ti Rakau Drive / SEART intersection below (**Section 3.4**) is also expected to experience poor LOS. It is expected that the mitigation measures discussed would remedy that intersection as well as this intersection by drawing demand away from Pakuranga Road eastbound to SEART, then turning right into Ti Rakau Drive. Therefore, mitigation measures are not recommended for the Pakuranga Road / Ti Rakau Drive intersection.

| Scenario | LOS | | DOS [v/c] | | Average Delay [sec] | |
|---|---|---|---|---|---|---|
| | AM | PM | AM | PM | AM | PM |
| Do-Minimum | D | E | 0.93 | 1.01 | 43 | 71 |
| Stage 2 Detour | D | F | 0.92 | 1.07 | 37 | 99 |

**Ti Rakau Drive / SEART intersection:**

- Intersection performance is poor (LOS F) during both the AM and PM peaks for the Do-Min scenario. The Stage 2 AM peak intersection performance is expected to be slightly improved (LOS E), however the PM peak is still poor (LOS F).
- The SEART right-turn lanes into Ti Rakau Drive are expected to operate at LOS F during the PM peak. The increase in demand (due to Reeves Road closure) results in delay increasing from around 50 sec to 215 sec (3.6 min), which would require mitigation.
- Mitigation 1 consists of an additional right-turn lane from SEART to Ti Rakau Drive eastbound and an additional exit lane on Ti Rakau Drive eastbound between SEART and William Roberts Road. Improved intersection performance is expected during both AM and PM peaks. <u>This option is recommended to be discussed with key stakeholders.</u>
- A further refinement of Mitigation 1 was also tested. It consisted of a 105 m short exit lane (AGRD04A (Austroads) – Table 5.5) on Ti Rakau Drive eastbound. Although intersection performance is expected to be similar to Mitigation 1 above, this geometric change would provide insufficient weave distance up to William Roberts Road and is not recommended.
- Mitigation 2 consists of the temporary removal of the pedestrian crossing on the eastern arm of the intersection, reducing phases to 3 and redistributing the greentime. Improved intersection performance is expected during both AM and PM peaks however, large queues are still expected in the SEART right-turn lanes.

| Scenario | LOS | | DOS [v/c] | | Average Delay [sec] | |
|---|---|---|---|---|---|---|
| | AM | PM | AM | PM | AM | PM |
| Do-Minimum | F | F | 0.89 | 1.15 | 178 | 98 |
| Stage 2 Detour | E | F | 0.91 | 1.13 | 60 | 120 |
| Mitigation 1 | D | E | 0.89 | 1.06 | 53 | 41 |
| Mitigation 2 | D | E | 0.87 | 0.97 | 41 | 77 |

**Ti Rakau Drive / Gossamer Drive intersection:**

- The right-turn traffic demand from Gossamer Drive into Ti Rakau Drive is expected to increase by around 160 veh/h. The resultant intersection performance is poor (LOS F) for the Stage 2 AM peak, compared to the LOS E of the Do-Min scenario. This would require mitigation.

- The intersection is expected to experience little change during the Stage 2 PM peak and will remain at LOS D.

- Mitigation 1 consists of the following changes to the northern Gossamer Drive approach: additional short right-turn lane (100 m), converting the short left-turn slip lane to pass through the intersection and providing 150 m stacking space and kerbside short exit lane length increased to 100 m. Intersection performance is expected to be slightly improved, compared to Stage 2 during the AM peak, however still LOS F. Furthermore, the additional control delay now imposed on the Gossamer Drive left-turn (previously a left-turn slip under the Do-Min and Stage 2 scenarios) has resulted in large delays (141 sec) and queues (478 m) in that lane. The PM peak is expected to experience improved performance.

- Mitigation 2 consists of the following changes to the northern Gossamer Drive approach: additional short lane (100 m) for the shared through and right-turn movements, converting the centre lane to a full left-turn lane, converting the short left-turn slip lane to pass through the intersection and providing 150 m stacking space and kerbside short exit lane length increased to 100 m. Improved intersection performance is expected during both the AM and PM peaks. <u>This option is recommended to be discussed with key stakeholders.</u>

| Scenario | LOS | | DOS [v/c] | | Average Delay [sec] | |
|---|---|---|---|---|---|---|
| | AM | PM | AM | PM | AM | PM |
| Do-Minimum | D | D | 1.02 | 0.90 | 48 | 45 |
| Stage 2 Detour | F | D | 1.25 | 0.88 | 168 | 43 |
| Mitigation 1 | F | D | 1.09 | 0.86 | 118 | 38 |
| Mitigation 2 | D | D | 0.89 | 0.86 | 37 | 37 |

- The impacts to buses through the project area are expected to be low as the frequencies of the 711 route in the AM inbound and PM outbound directions are only 4 buses/h (1 every 15min).

## 1.0 Introduction

The proposed construction sequencing of the Eastern Busway, relevant to this Technical Advice Note, are as follows:

- Stage 1 – Extension of William Roberts Road south to Ti Rakau Drive as well as completing the Cortina Place link between William Roberts Road and Reeves Road. During this stage, Reeves Road will remain open, providing site access through Cortina Place and William Roberts Road. **Figure 1** provides an overview of Stage 1.


**Figure 1: Stage 1 overview**

- Stage 2 – Closure of Reeves Road between Ti Rakau Drive and William Roberts Road. At the completion of Stage 1, William Roberts Road is intended to be a left-in left-out (LILO) only at the intersection with Ti Rakau Drive. Therefore, due to the Reeves Road closure and the LILO arrangement at the William Roberts Road / Ti Rakau Drive intersection, an alternative detour route is proposed for traffic usually traveling along Reeves Road toward the SEART. **Figure 2** provides an overview of Stage 2.


**Figure 2: Stage 2 overview**

The proposed detour will route traffic north along William Roberts Road, west along Pakuranga Road, south along Ti Rakau Drive and finally west along SEART. The purpose of this Technical Advice Note is to assess the proposed detour route.

## 2.0 Assessment Methodology

**AIMSUN:**

- Operational Microsimulation Models – These models provide information about travel times along different routes within the project area as well as turn movements and traffic demand along roads within the project area.
- The proposed geometric changes of Stage 1 and Stage 2 were updated within the AIMSUN model to determine re-routed traffic demands along roads within the project area.
- The turning movement outputs at intersections from this model were used as inputs into SIDRA models.

**SIDRA:**

- Intersection models – These models are used to determine the performance of intersections using traffic movement data from AIMSUN models. The key outputs include degree of saturation (DOS), level of service (LOS), delays and queue lengths.
- The proposed geometric changes of Stage 1 and Stage 2 were updated within the SIDRA model and the AIMSUN turning movements were imported.
- The results of this 'Stage 2' scenario were compared to a 'Do Minimum' scenario in order to determine and assess the potential impact of the proposed Stage 2 and associated disruption.

Eastern Busway Alliance

Fletcher | acciona | AECOM | Jacobs

### 3.0 Lane Performance Summaries

### 3.1 William Roberts Road / Reeves Road

### 3.1.1 AM Peak

- NOTE: The Reeves Road west approach to this intersection in the Stage 2 scenario has been closed. For the Stage 2 detour this intersection is expected to operate with good LOS in the AM, the removal of the Reeves Road west approach reduces much of the opposing flows.
- Total intersection demand decreased by around 300 veh/h and the Reeves Road east approach right-turn increased by around 30 veh/h.
- It is clear from the comparison below that Reeves Road westbound traffic demand has decreased and only a small percentage of traffic is routing along the proposed detour north on William Roberts Road. This is a general trend for all intersection assessed and will be detailed further in later sections of this Technical Advice Note.

**Table 1: William Roberts Rd / Reeves Rd – Do-Min vs Stage 2 (AM)**

Lane Use and Performance

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | AVERAGE BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: William Roberts Rd (South) | | | | | | | | | | | | | | | |
| Lane 1 | 39 | 2.6 | 39 | 2.6 | 337 | 0.116 | 100 | 10.9 | LOS B | 0.1 | 0.9 | Full | 170 | -20.4[N7] | 0.0 |
| Approach | 39 | 2.6 | 39 | 2.6 | | 0.116 | | 10.9 | LOS B | 0.1 | 0.9 | | | | |
| East: Reeves Rd (East) | | | | | | | | | | | | | | | |
| Lane 1 | 375 | 6.1 | 375 | 6.1 | 1831 | 0.205 | 100 | 0.2 | LOS A | 0.0 | 0.0 | Full | 266 | 0.0 | 0.0 |
| Lane 2 | 103 | 11.7 | 103 | 11.7 | 562 | 0.183 | 100 | 5.5 | LOS A | 0.2 | 1.2 | Short | 13 | -49.9[N7] | NA |
| Approach | 478 | 7.3 | 478 | 7.3 | | 0.205 | | 1.3 | NA | 0.2 | 1.2 | | | | |
| North: William Roberts Rd (North) | | | | | | | | | | | | | | | |
| Lane 1 | 283 | 5.7 | 235 | 4.2 | 344 | 0.683 | 100 | 24.2 | LOS C | 2.0 | 14.6 | Full | 244 | 0.0 | 0.0 |
| Approach | 283 | 5.7 | 235[N1] | 4.2 | | 0.683 | | 24.2 | LOS C | 2.0 | 14.6 | | | | |
| West: Reeves Rd (West) | | | | | | | | | | | | | | | |
| Lane 1 | 41 | 9.8 | 40 | 9.9 | 832 | 0.048 | 100 | 4.1 | LOS A | 0.0 | 0.0 | Short | 53 | -49.9[N7] | NA |
| Lane 2 | 143 | 12.6 | 139 | 12.8 | 1803 | 0.077 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 55 | 0.0 | 0.0 |
| Lane 3 | 11 | 0.0 | 11 | 0.0 | 1238 | 0.009 | 100 | 5.4 | LOS A | 0.0 | 0.1 | Short | 13 | 0.0 | NA |
| Approach | 195 | 11.3 | 190[N1] | 11.4 | | 0.077 | | 1.2 | NA | 0.0 | 0.1 | | | | |
| Intersection | 995 | 7.4 | 942[N1] | 7.9 | | 0.683 | | 7.4 | NA | 2.0 | 14.6 | | | | |

Lane Use and Performance

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | AVERAGE BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: William Roberts Rd (South) | | | | | | | | | | | | | | | |
| Lane 1 | 136 | 7.4 | 135 | 7.4 | 745 | 0.182 | 100 | 5.9 | LOS A | 0.6[N5] | 4.5[N5] | Full | 243 | -19.0[N3] | 11.8 |
| Approach | 136 | 7.4 | 135[N1] | 7.4 | | 0.182 | | 5.9 | LOS A | 0.6 | 4.5 | | | | |
| East: Reeves Rd (East) | | | | | | | | | | | | | | | |
| Lane 1 | 215 | 5.6 | 215 | 5.6 | 1758 | 0.122 | 100 | 4.6 | LOS A | 0.0 | 0.0 | Full | 266 | 0.0 | 0.0 |
| Lane 2 | 134 | 9.0 | 134 | 9.0 | 1718 | 0.078 | 100 | 4.7 | LOS A | 2.6[N5] | 19.4[N5] | Short | 13 | 0.0 | NA |
| Approach | 349 | 6.9 | 349 | 6.9 | | 0.122 | | 4.6 | NA | 2.6 | 19.4 | | | | |
| North: William Roberts Rd (North) | | | | | | | | | | | | | | | |
| Lane 1 | 212 | 12.3 | 89 | 7.7 | 1216 | 0.073 | 100 | 5.3 | LOS A | 0.1 | 0.9 | Full | 244 | 0.0 | 0.0 |
| Approach | 212 | 12.3 | 89[N1] | 7.7 | | 0.073 | | 5.3 | LOS A | 0.1 | 0.9 | | | | |
| Intersection | 697 | 8.6 | 573[N1] | 10.5 | | 0.182 | | 5.0 | NA | 2.6 | 19.4 | | | | |

### 3.1.2 PM Peak

- The intersection is expected to operate with good LOS in PM with the Stage 2 detour.
- Total intersection demand decreased by around 500 veh/h and the Reeves Road east approach right-turn increased by around 30 veh/h. The William Roberts Road south approach demand increased by around 230 veh/h, indicating an increase in vehicles routing from Ti Rakau Drive at the new LILO intersection further south.

**Table 2: William Roberts Rd / Reeves Rd – Do-Min vs Stage 2 (PM)**

Lane Use and Performance

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | AVERAGE BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: William Roberts Rd (South) | | | | | | | | | | | | | | | |
| Lane 1 | 46 | 4.3 | 46 | 4.3 | 270 | 0.170 | 100 | 13.3 | LOS B | 2.6[N5] | 19.2[N5] | Full | 170 | -20.7[N3] | 16.8 |
| Approach | 46 | 4.3 | 46 | 4.3 | | 0.170 | | 13.3 | LOS B | 2.6 | 19.2 | | | | |
| East: Reeves Rd (East) | | | | | | | | | | | | | | | |
| Lane 1 | 140 | 8.6 | 140 | 8.6 | 1794 | 0.078 | 100 | 0.3 | LOS A | 0.0 | 0.0 | Full | 266 | 0.0 | 2.7[8] |
| Lane 2 | 53 | 24.5 | 53 | 24.5 | 523 | 0.101 | 100 | 10.3 | LOS B | 11.7[N5] | 98.8[N5] | Short | 13 | 0.0 | NA |
| Approach | 193 | 13.0 | 193 | 13.0 | | 0.101 | | 3.1 | NA | 11.7 | 98.8 | | | | |
| North: William Roberts Rd (North) | | | | | | | | | | | | | | | |
| Lane 1 | 259 | 15.8 | 217 | 15.0 | 250 | 0.869 | 100 | 50.0 | LOS F | 3.3 | 25.9 | Full | 244 | 0.0 | 0.0 |
| Approach | 259 | 15.8 | 217[N1] | 15.0 | | 0.869 | | 50.0 | LOS F | 3.3 | 25.9 | | | | |
| West: Reeves Rd (West) | | | | | | | | | | | | | | | |
| Lane 1 | 259 | 9.7 | 256 | 9.7 | 1665 | 0.154 | 100 | 4.1 | LOS A | 7.3[N6] | 55.0[N6] | Short | 53 | 0.0 | NA |
| Lane 2 | 427 | 9.8 | 423 | 9.9 | 1841 | 0.230 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 55 | 0.0 | 49.9[8] |
| Lane 3 | 43 | 4.7 | 43 | 4.7 | 1542 | 0.028 | 100 | 4.5 | LOS A | 0.0 | 0.4 | Short | 13 | 0.0 | NA |
| Approach | 729 | 9.5 | 722[N1] | 9.5 | | 0.230 | | 1.7 | NA | 7.3 | 55.0 | | | | |
| Intersection | 1227 | 11.2 | 1178[N1] | 11.6 | | 0.869 | | 11.3 | NA | 11.7 | 98.8 | | | | |

Lane Use and Performance

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | AVERAGE BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: William Roberts Rd (South) | | | | | | | | | | | | | | | |
| Lane 1 | 274 | 9.2 | 273 | 9.2 | 698 | 0.391 | 100 | 5.0 | LOS A | 24.8[N5] | 187.3[N5] | Full | 243 | -35.9[N3] | 29.9 |
| Approach | 274 | 9.2 | 273[N1] | 9.2 | | 0.391 | | 5.0 | LOS A | 24.8 | 187.3 | | | | |
| East: Reeves Rd (East) | | | | | | | | | | | | | | | |
| Lane 1 | 47 | 4.3 | 47 | 4.3 | 1774 | 0.026 | 100 | 4.6 | LOS A | 0.0 | 0.0 | Full | 266 | 0.0 | 5.6[8] |
| Lane 2 | 81 | 22.2 | 81 | 22.2 | 1578 | 0.051 | 100 | 4.8 | LOS A | 13.1[N5] | 109.3[N5] | Short | 13 | 0.0 | NA |
| Approach | 128 | 15.6 | 128 | 15.6 | | 0.051 | | 4.7 | NA | 13.1 | 109.3 | | | | |
| North: William Roberts Rd (North) | | | | | | | | | | | | | | | |
| Lane 1 | 342 | 9.6 | 162 | 7.8 | 1510 | 0.107 | 100 | 4.9 | LOS A | 0.2 | 1.5 | Full | 244 | 0.0 | 0.0 |
| Approach | 342 | 9.6 | 162[N1] | 7.8 | | 0.107 | | 4.9 | LOS A | 0.2 | 1.5 | | | | |
| Intersection | 744 | 10.5 | 563[N1] | 13.9 | | 0.391 | | 4.9 | NA | 24.8 | 187.3 | | | | |

## 3.2 William Roberts Road / Pakuranga Road

### 3.2.1 AM Peak

- The Do-Min scenario performance is poor, specifically the shared left and right-turn lane out of William Roberts Road and the Pakuranga Road west right-turn during the AM.
- The results below indicate that the Stage 2 detour results in overall intersection performance that is worse than the Do-Min in the AM, but in practical terms the intersection is saturated, and the impact of the detour is considered negligible.

**Table 3: William Roberts Rd / Pakuranga Rd – Do-Min vs Stage 2 (AM)**

Lane Use and Performance

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | AVERAGE BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **South: William Roberts Road** | | | | | | | | | | | | | | | |
| Lane 1 | 147 | 9.5 | 146 | 9.6 | 15 | 9.462 | 100 | 7695.3 | LOS F | 32.2[N4] | 243.9[N4] | Full | 244 | 0.0 | 49.9 |
| Approach | 147 | 9.5 | 146[N1] | 9.6 | | 9.462 | | 7695.3 | LOS F | 32.2 | 243.9 | | | | |
| **East: Pakuranga Road (East)** | | | | | | | | | | | | | | | |
| Lane 1 | 991 | 5.3 | 991 | 5.3 | 1824 | 0.543 | 100 | 1.4 | LOS A | 0.0 | 0.0 | Full | 184 | 0.0 | 0.0 |
| Lane 2 | 825 | 5.7 | 825 | 5.7 | 1519 | 0.543 | 100 | 0.1 | LOS A | 0.0 | 0.0 | Full | 184 | -17.0[N7] | 0.0 |
| Lane 3 | 866 | 5.7 | 866 | 5.7 | 1593 | 0.543 | 100 | 0.1 | LOS A | 0.0 | 0.0 | Full | 184 | -13.9[N7] | 0.0 |
| Approach | 2682 | 5.6 | 2682 | 5.6 | | 0.543 | | 0.6 | NA | 0.0 | 0.0 | | | | |
| **West: Pakuranga Road (West)** | | | | | | | | | | | | | | | |
| Lane 1 | 526 | 6.8 | 509 | 6.9 | 1847 | 0.276 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 152 | 0.0 | 0.0 |
| Lane 2 | 509 | 6.8 | 493 | 6.9 | 1788 | 0.276 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 152 | 0.0 | 0.0 |
| Lane 3 | 11 | 6.8 | 11 | 6.9 | 39[15] | 0.276 | 100 | 498.4 | LOS F | 1.6 | 11.5 | Full | 152 | 0.0 | 48.6[8] |
| Lane 4 | 54 | 13.0 | 52 | 13.2 | 6 | 8.723 | 100 | 7175.8 | LOS F | 19.3 | 150.2 | Short | 60 | 0.0 | NA |
| Approach | 1100 | 7.1 | 1065[N1] | 7.2 | | 8.723 | | 357.6 | NA | 19.3 | 150.2 | | | | |
| Intersection | 3929 | 6.2 | 3893[N1] | 6.2 | | 9.462 | | 386.9 | NA | 32.2 | 243.9 | | | | |

Lane Use and Performance

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | AVERAGE BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **South: William Roberts Road** | | | | | | | | | | | | | | | |
| Lane 1 | 159 | 8.2 | 159 | 8.2 | 32 | 4.904 | 100 | 3578.9 | LOS F | 32.6[N4] | 243.9[N4] | Full | 244 | 0.0 | 49.9 |
| Approach | 159 | 8.2 | 159 | 8.2 | | 4.904 | | 3578.9 | LOS F | 32.6 | 243.9 | | | | |
| **East: Pakuranga Road (East)** | | | | | | | | | | | | | | | |
| Lane 1 | 766 | 5.7 | 766 | 5.7 | 1832 | 0.418 | 100 | 0.6 | LOS A | 0.0 | 0.0 | Full | 184 | 0.0 | 0.0 |
| Lane 2 | 765 | 5.9 | 765 | 5.9 | 1829 | 0.418 | 100 | 0.1 | LOS A | 0.0 | 0.0 | Full | 184 | 0.0 | 0.0 |
| Lane 3 | 773 | 5.9 | 773 | 5.9 | 1849 | 0.418 | 100 | 0.1 | LOS A | 0.0 | 0.0 | Full | 184 | 0.0 | 0.0 |
| Approach | 2305 | 5.8 | 2305 | 5.8 | | 0.418 | | 0.2 | NA | 0.0 | 0.0 | | | | |
| **West: Pakuranga Road (West)** | | | | | | | | | | | | | | | |
| Lane 1 | 724 | 7.2 | 710 | 7.3 | 1842 | 0.386 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 152 | 0.0 | 0.0 |
| Lane 2 | 701 | 7.2 | 688 | 7.3 | 1784 | 0.386 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 152 | 0.0 | 0.0 |
| Lane 3 | 20 | 7.2 | 20 | 7.3 | 51[15] | 0.386 | 100 | 268.2 | LOS F | 1.5 | 11.5 | Full | 152 | 0.0 | 49.9[8] |
| Lane 4 | 135 | 15.6 | 133 | 15.7 | 12 | 10.962 | 100 | 9061.0 | LOS F | 19.1[N4] | 151.9[N4] | Short | 60 | 0.0 | NA |
| Approach | 1580 | 7.9 | 1550[N1] | 8.0 | | 10.962 | | 778.4 | NA | 19.1 | 151.9 | | | | |
| Intersection | 4044 | 6.7 | 4014[N1] | 6.8 | | 10.962 | | 442.4 | NA | 32.6 | 243.9 | | | | |

### 3.2.2 PM Peak

- Similar to the AM, the Do-Min scenario performance is poor, specifically the shared left and right-turn lane out of William Roberts Road and the Pakuranga Road west right-turn during the PM.
- In practical terms the intersection is already over-saturated in the Do-Min PM peak, and the impact of the detour is considered negligible.
- During the Stage 2 detour the Pakuranga Road west right-turn lane is expected to perform worse than the Do-Min during the PM, with high delay and LOS F.

**Table 4: William Roberts Rd / Pakuranga Rd – Do-Min vs Stage 2 (PM)**

Lane Use and Performance

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | AVERAGE BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: William Roberts Road | | | | | | | | | | | | | | | |
| Lane 1 | 326 | 11.7 | 324 | 11.7 | 10 | 32.923 | 100 | 28787.8 | LOS F | 31.7[N4] | 243.9[N4] | Full | 244 | 0.0 | 49.9 |
| Approach | 326 | 11.7 | 324[N1] | 11.7 | | 32.923 | | 28787.8 | LOS F | 31.7 | 243.9 | | | | |
| East: Pakuranga Road (East) | | | | | | | | | | | | | | | |
| Lane 1 | 469 | 8.0 | 469 | 8.0 | 1787 | 0.262 | 100 | 1.6 | LOS A | 0.0 | 0.0 | Full | 184 | 0.0 | 0.0 |
| Lane 2 | 477 | 6.8 | 477 | 6.8 | 1818 | 0.262 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 184 | 0.0 | 0.0 |
| Lane 3 | 482 | 6.8 | 482 | 6.8 | 1838 | 0.262 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 184 | 0.0 | 0.0 |
| Approach | 1427 | 7.2 | 1427 | 7.2 | | 0.262 | | 0.5 | NA | 0.0 | 0.0 | | | | |
| West: Pakuranga Road (West) | | | | | | | | | | | | | | | |
| Lane 1 | 1177 | 4.8 | 1047 | 4.8 | 1871 | 0.559 | 100 | 0.1 | LOS A | 0.0 | 0.0 | Full | 152 | 0.0 | 0.0 |
| Lane 2 | 1140 | 4.8 | 1014 | 4.8 | 1812 | 0.559 | 100 | 0.1 | LOS A | 0.0 | 0.0 | Full | 152 | 0.0 | 0.0 |
| Lane 3 | 250 | 4.8 | 222 | 4.8 | 397[1]5 | 0.559 | 100 | 63.4 | LOS F | 4.6 | 33.5 | Full | 152 | 0.0 | 10.8[8] |
| Lane 4 | 133 | 20.3 | 118 | 20.4 | 91 | 1.298 | 100 | 349.8 | LOS F | 9.0 | 73.7 | Short | 60 | 0.0 | NA |
| Approach | 2700 | 5.5 | 2401[N1] | 5.6 | | 1.298 | | 23.2 | NA | 9.0 | 73.7 | | | | |
| Intersection | 4453 | 6.5 | 4152[N1] | 7.0 | | 32.923 | | 2259.1 | NA | 31.7 | 243.9 | | | | |

Lane Use and Performance

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | AVERAGE BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: William Roberts Road | | | | | | | | | | | | | | | |
| Lane 1 | 235 | 12.3 | 234 | 12.4 | 12 | 18.936 | 100 | 16209.3 | LOS F | 31.5[N4] | 243.9[N4] | Full | 244 | 0.0 | 49.9 |
| Approach | 235 | 12.3 | 234[N1] | 12.4 | | 18.936 | | 16209.3 | LOS F | 31.5 | 243.9 | | | | |
| East: Pakuranga Road (East) | | | | | | | | | | | | | | | |
| Lane 1 | 496 | 6.5 | 496 | 6.5 | 1820 | 0.272 | 100 | 0.8 | LOS A | 0.0 | 0.0 | Full | 184 | 0.0 | 0.0 |
| Lane 2 | 495 | 7.0 | 495 | 7.0 | 1816 | 0.272 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 184 | 0.0 | 0.0 |
| Lane 3 | 500 | 7.0 | 500 | 7.0 | 1836 | 0.272 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 184 | 0.0 | 0.0 |
| Approach | 1490 | 6.8 | 1490 | 6.8 | | 0.272 | | 0.3 | NA | 0.0 | 0.0 | | | | |
| West: Pakuranga Road (West) | | | | | | | | | | | | | | | |
| Lane 1 | 1218 | 5.4 | 996 | 5.4 | 1864 | 0.534 | 100 | 0.1 | LOS A | 0.0 | 0.0 | Full | 152 | 0.0 | 0.0 |
| Lane 2 | 1179 | 5.4 | 964 | 5.4 | 1805 | 0.534 | 100 | 0.1 | LOS A | 0.0 | 0.0 | Full | 152 | 0.0 | 0.0 |
| Lane 3 | 178 | 5.4 | 145 | 5.4 | 272[1]5 | 0.534 | 100 | 47.9 | LOS E | 2.1 | 15.4 | Full | 152 | 0.0 | 49.9[8] |
| Lane 4 | 273 | 11.4 | 223 | 11.4 | 93 | 2.390 | 100 | 1289.6 | LOS F | 19.8[N4] | 151.9[N4] | Short | 60 | 0.0 | NA |
| Approach | 2848 | 5.9 | 2328[N1] | 6.0 | | 2.390 | | 126.6 | NA | 19.8 | 151.9 | | | | |
| Intersection | 4573 | 6.6 | 4053[N1] | 7.4 | | 18.936 | | 1010.3 | NA | 31.5 | 243.9 | | | | |

Eastern Busway Alliance

Fletcher | acciona | AECOM | Jacobs

## 3.3 Pakuranga Road / Ti Rakau Drive

### 3.3.1 AM Peak

- The Stage 2 detour intersection performance is expected to be only slightly improved during the AM peak compared to the Do-Min scenario.
- The Pakuranga Road east left-turn is expected to operate at LOS C.
- Total intersection demand increased by around 300 veh/h, with increases on Ti Rakau Drive south approach and the Pakuranga Road west approach.

**Table 5: Pakuranga Rd / Ti Rakau Dr – Do-Min vs Stage 2 (AM)**

Lane Use and Performance (Do-Min)

| | DEMAND FLOWS [ Total | HV ] | ARRIVAL FLOWS [ Total | HV ] | Cap. | Deg. Satn | Lane Util. | Aver. Delay | Level of Service | AVERAGE BACK OF QUEUE [ Veh | Dist ] | Lane Config | Lane Length | Cap. Adj. | Prob. Block. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | veh/h | % | veh/h | % | veh/h | v/c | % | sec | | | m | | m | % | % |
| South: Ti Rakau Drive | | | | | | | | | | | | | | | |
| Lane 1 | 583 | 7.5 | 509 | 7.8 | 759[1] | 0.671 | 100 | 29.8 | LOS C | 14.4 | 107.9 | Full | 130 | 0.0 | 32.6 |
| Lane 2 (B) | 14 | 100.0 | 14 | 100.0 | 326 | 0.043 | 100 | 48.0 | LOS D | 0.5 | 6.0 | Short | 16 | 0.0 | NA |
| Lane 3 | 166 | 4.6 | 145 | 4.8 | 502 | 0.288 | 100 | 50.5 | LOS D | 5.1 | 37.4 | Full | 130 | 0.0 | 0.0 |
| Lane 4 | 166 | 4.6 | 145 | 4.8 | 502 | 0.288 | 100 | 50.5 | LOS D | 5.1 | 37.4 | Full | 130 | 0.0 | 0.0 |
| Lane 5 | 166 | 4.6 | 145 | 4.8 | 502 | 0.288 | 100 | 50.5 | LOS D | 5.1 | 37.4 | Short | 40 | 0.0 | NA |
| Approach | 1094 | 7.4 | 957[N1] | 7.8 | | 0.671 | | 39.5 | LOS D | 14.4 | 107.9 | | | | |
| East: Pakuranga Road (East) | | | | | | | | | | | | | | | |
| Lane 1 | 1019 | 4.2 | 974 | 4.3 | 1113 | 0.875 | 100 | 20.0 | LOS B | 15.6[N4] | 113.0[N4] | Full | 113 | 0.0 | 50.0 |
| Lane 2 | 757 | 5.8 | 724 | 6.0 | 781 | 0.927 | 100 | 62.7 | LOS E | 15.4[N4] | 113.0[N4] | Full | 113 | 0.0 | 50.0 |
| Lane 3 | 740 | 5.8 | 707 | 6.0 | 763[1] | 0.927 | 100 | 62.6 | LOS E | 15.4[N4] | 113.0[N4] | Full | 113 | 0.0 | 50.0 |
| Lane 4 (B) | 19 | 100.0 | 19 | 100.0 | 47 | 0.406 | 100 | 85.2 | LOS F | 0.9 | 12.2 | Short | 101 | 0.0 | NA |
| Approach | 2535 | 5.9 | 2424[N1] | 6.0 | | 0.927 | | 45.7 | LOS D | 15.6 | 113.0 | | | | |
| West: Pakuranga Road (West) | | | | | | | | | | | | | | | |
| Lane 1 (B) | 24 | 100.0 | 24 | 100.0 | 44 | 0.541 | 100 | 90.8 | LOS F | 1.2 | 15.6 | Full | 388 | 0.0 | 0.0 |
| Lane 2 | 201 | 7.8 | 201 | 7.8 | 893 | 0.225 | 100 | 24.1 | LOS C | 5.2 | 39.0 | Short | 141 | 0.0 | NA |
| Lane 3 | 201 | 7.8 | 201 | 7.8 | 893 | 0.225 | 100 | 24.1 | LOS C | 5.2 | 39.0 | Full | 388 | 0.0 | 0.0 |
| Lane 4 | 201 | 7.8 | 201 | 7.8 | 893 | 0.225 | 100 | 24.1 | LOS C | 5.2 | 39.0 | Full | 388 | 0.0 | 0.0 |
| Lane 5 | 177 | 13.6 | 177 | 13.6 | 226 | 0.782 | 100 | 62.4 | LOS E | 6.0 | 47.2 | Short | 184 | 0.0 | NA |
| Lane 6 | 177 | 13.6 | 177 | 13.6 | 226 | 0.782 | 100 | 62.4 | LOS E | 6.0 | 47.2 | Short | 109 | 0.0 | NA |
| Approach | 981 | 12.1 | 981 | 12.1 | | 0.782 | | 39.5 | LOS D | 6.0 | 47.2 | | | | |
| Intersection | 4610 | 7.6 | 4361[N1] | 8.0 | | 0.927 | | 42.9 | LOS D | 15.6 | 113.0 | | | | |

Lane Use and Performance (Stage 2)

| | DEMAND FLOWS [ Total | HV ] | ARRIVAL FLOWS [ Total | HV ] | Cap. | Deg. Satn | Lane Util. | Aver. Delay | Level of Service | AVERAGE BACK OF QUEUE [ Veh | Dist ] | Lane Config | Lane Length | Cap. Adj. | Prob. Block. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | veh/h | % | veh/h | % | veh/h | v/c | % | sec | | | m | | m | % | % |
| South: Ti Rakau Drive | | | | | | | | | | | | | | | |
| Lane 1 | 701 | 9.1 | 635 | 9.3 | 841[1] | 0.754 | 100 | 24.4 | LOS C | 17.2[N4] | 130.0[N4] | Full | 130 | 0.0 | 50.0 |
| Lane 2 (B) | 16 | 100.0 | 16 | 100.0 | 348 | 0.046 | 100 | 45.7 | LOS D | 0.5 | 6.7 | Short | 16 | 0.0 | NA |
| Lane 3 | 225 | 4.4 | 203 | 4.5 | 538 | 0.378 | 100 | 49.6 | LOS D | 7.3 | 52.9 | Full | 130 | 0.0 | 0.0 |
| Lane 4 | 203 | 4.4 | 184 | 4.5 | 487[1] | 0.378 | 100 | 49.0 | LOS D | 6.5 | 47.2 | Full | 130 | 0.0 | 0.0 |
| Lane 5 | 203 | 4.4 | 184 | 4.5 | 487[1] | 0.378 | 100 | 49.0 | LOS D | 6.5 | 47.2 | Short | 40 | 0.0 | NA |
| Approach | 1348 | 8.0 | 1221[N1] | 8.2 | | 0.754 | | 36.3 | LOS D | 17.2 | 130.0 | | | | |
| East: Pakuranga Road (East) | | | | | | | | | | | | | | | |
| Lane 1 | 1062 | 4.8 | 1004 | 4.9 | 1097 | 0.915 | 100 | 29.6 | LOS C | 15.5[N4] | 113.0[N4] | Full | 113 | 0.0 | 50.0 |
| Lane 2 | 592 | 5.3 | 559 | 5.4 | 735 | 0.761 | 100 | 42.8 | LOS D | 15.4[N4] | 113.0[N4] | Full | 113 | 0.0 | 50.0 |
| Lane 3 | 574 | 5.3 | 543 | 5.4 | 713[1] | 0.761 | 100 | 42.3 | LOS D | 15.4[N4] | 113.0[N4] | Full | 113 | 0.0 | 50.0 |
| Lane 4 (B) | 19 | 100.0 | 19 | 100.0 | 47 | 0.406 | 100 | 85.2 | LOS F | 0.9 | 12.2 | Short | 101 | 0.0 | NA |
| Approach | 2247 | 5.9 | 2125[N1] | 6.0 | | 0.915 | | 36.8 | LOS D | 15.5 | 113.0 | | | | |
| West: Pakuranga Road (West) | | | | | | | | | | | | | | | |
| Lane 1 (B) | 24 | 100.0 | 24 | 100.0 | 35 | 0.690 | 100 | 95.0 | LOS F | 1.3 | 16.3 | Full | 388 | -21.6[N7] | 0.0 |
| Lane 2 | 319 | 9.4 | 319 | 9.4 | 848 | 0.376 | 100 | 28.1 | LOS C | 9.3 | 70.2 | Short | 141 | 0.0 | NA |
| Lane 3 | 319 | 9.4 | 319 | 9.4 | 848 | 0.376 | 100 | 28.1 | LOS C | 9.3 | 70.2 | Full | 388 | 0.0 | 0.0 |
| Lane 4 | 319 | 9.4 | 319 | 9.4 | 848 | 0.376 | 100 | 28.1 | LOS C | 9.3 | 70.2 | Full | 388 | 0.0 | 0.0 |
| Lane 5 | 187 | 13.9 | 187 | 13.9 | 236 | 0.792 | 100 | 64.6 | LOS E | 6.6 | 51.4 | Short | 184 | 0.0 | NA |
| Lane 6 | 130 | 13.9 | 130 | 13.9 | 164 | 0.792 | 100 | 67.5 | LOS E | 4.7 | 37.0 | Short | 109 | -30.6[N7] | NA |
| Approach | 1297 | 12.2 | 1297 | 12.2 | | 0.792 | | 38.6 | LOS D | 9.3 | 70.2 | | | | |
| Intersection | 4892 | 8.1 | 4643[N1] | 8.6 | | 0.915 | | 37.2 | LOS D | 17.2 | 130.0 | | | | |

### 3.3.2 PM Peak

- During the PM peak the intersection is expected to perform at LOS F during Stage 2, compared to the LOS E of the Do-Min scenario.
- Demand seems to have increased on Pakuranga Road west (and east), however the west approach is already saturated, causing delays to increase further.
- NOTE: The Ti Rakau Drive / SEART intersection (**Section 3.4** below) is also expected to experience poor LOS. It is expected that the mitigation measures discussed in **Section 3.4.3** would remedy that intersection as well as this intersection by drawing demand away from Pakuranga Road eastbound to SEART, then turning right into Ti Rakau Drive. Therefore, mitigation measures are not recommended for the Pakuranga Road / Ti Rakau Drive intersection.

**Table 6: Pakuranga Rd / Ti Rakau Dr – Do-Min vs Stage 2 (PM)**

**Lane Use and Performance**

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | AVERAGE BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **South: Ti Rakau Drive** | | | | | | | | | | | | | | | |
| Lane 1 | 680 | 6.6 | 655 | 6.6 | 1109[1] | 0.591 | 100 | 13.5 | LOS B | 12.3 | 90.6 | Full | 130 | 0.0 | 16.7 |
| Lane 2 (B) | 12 | 100.0 | 12 | 100.0 | 528 | 0.023 | 100 | 28.6 | LOS C | 0.3 | 3.8 | Short | 16 | 0.0 | NA |
| Lane 3 | 654 | 3.1 | 630 | 3.1 | 657 | 0.960 | 100 | 83.7 | LOS F | 18.1[N4] | 130.0[N4] | Full | 130 | -21.7[N3] | 50.0 |
| Lane 4 | 393 | 3.1 | 379 | 3.1 | 394[1] | 0.960 | 100 | 86.6 | LOS F | 18.1[N4] | 130.0[N4] | Full | 130 | -22.5[N3] | 50.0[8] |
| Lane 5 | 389 | 3.1 | 375 | 3.1 | 390[1] | 0.960 | 100 | 87.0 | LOS F | 18.1[N4] | 130.0[N4] | Short | 40 | -24.0[N3] | NA |
| Approach | 2128 | 4.8 | 2051[N1] | 4.8 | | 0.960 | | 62.1 | LOS E | 18.1 | 130.0 | | | | |
| **East: Pakuranga Road (East)** | | | | | | | | | | | | | | | |
| Lane 1 | 575 | 2.3 | 514 | 2.4 | 1116 | 0.461 | 100 | 14.2 | LOS B | 6.6 | 47.1 | Full | 113 | 0.0 | 0.0 |
| Lane 2 | 426 | 8.0 | 382 | 8.5 | 420 | 0.909 | 100 | 77.6 | LOS E | 15.0[N4] | 113.0[N4] | Full | 113 | 0.0 | 50.0 |
| Lane 3 | 421 | 8.0 | 378 | 8.5 | 416[1] | 0.909 | 100 | 77.6 | LOS E | 15.0[N4] | 113.0[N4] | Full | 113 | 0.0 | 50.0 |
| Lane 4 (B) | 11 | 100.0 | 11 | 100.0 | 47 | 0.235 | 100 | 83.9 | LOS F | 0.5 | 6.9 | Short | 101 | 0.0 | NA |
| Approach | 1433 | 6.4 | 1285[N1] | 6.9 | | 0.909 | | 52.3 | LOS D | 15.0 | 113.0 | | | | |
| **West: Pakuranga Road (West)** | | | | | | | | | | | | | | | |
| Lane 1 (B) | 40 | 100.0 | 40 | 100.0 | 40 | 1.008 | 100 | 135.2 | LOS F | 2.6 | 33.3 | Full | 388 | -11.1[N7] | 0.0 |
| Lane 2 | 426 | 6.7 | 426 | 6.7 | 437 | 0.975 | 100 | 99.5 | LOS F | 26.1 | 192.9 | Short | 141 | -21.7[N3] | NA |
| Lane 3 | 422 | 6.7 | 422 | 6.7 | 433 | 0.975 | 100 | 99.7 | LOS F | 25.8 | 191.2 | Full | 388 | -22.5[N3] | 0.0 |
| Lane 4 | 414 | 6.7 | 414 | 6.7 | 424 | 0.975 | 100 | 100.1 | LOS F | 25.4 | 187.9 | Full | 388 | -24.0[N3] | 0.0 |
| Lane 5 | 195 | 7.7 | 195 | 7.7 | 245 | 0.796 | 100 | 73.6 | LOS E | 7.0 | 52.1 | Short | 184 | 0.0 | NA |
| Lane 6 | 195 | 7.7 | 195 | 7.7 | 245 | 0.796 | 100 | 73.6 | LOS E | 7.0 | 52.1 | Short | 109 | 0.0 | NA |
| Approach | 1692 | 9.2 | 1692 | 9.2 | | 1.008 | | 94.6 | LOS F | 26.1 | 192.9 | | | | |
| Intersection | 5253 | 6.6 | 5028[N1] | 6.9 | | 1.008 | | 70.5 | LOS E | 26.1 | 192.9 | | | | |

**Lane Use and Performance**

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | AVERAGE BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **South: Ti Rakau Drive** | | | | | | | | | | | | | | | |
| Lane 1 | 725 | 6.5 | 696 | 6.4 | 1074[1] | 0.648 | 100 | 14.4 | LOS B | 14.7 | 108.8 | Full | 130 | 0.0 | 33.4 |
| Lane 2 (B) | 12 | 100.0 | 12 | 100.0 | 492 | 0.024 | 100 | 31.6 | LOS C | 0.3 | 4.0 | Short | 16 | 0.0 | NA |
| Lane 3 | 604 | 4.2 | 580 | 4.1 | 545 | 1.064 | 100 | 153.3 | LOS F | 17.9[N4] | 130.0[N4] | Full | 130 | -29.6[N3] | 50.0 |
| Lane 4 | 378 | 4.2 | 363 | 4.1 | 341[1] | 1.064 | 100 | 164.3 | LOS F | 17.9[N4] | 130.0[N4] | Full | 130 | -30.4[N3] | 50.0[8] |
| Lane 5 | 406 | 4.2 | 390 | 4.1 | 366[1] | 1.064 | 100 | 162.4 | LOS F | 17.9[N4] | 130.0[N4] | Short | 40 | -20.0[N7] | NA |
| Approach | 2125 | 5.5 | 2040[N1] | 5.5 | | 1.064 | | 108.9 | LOS F | 17.9 | 130.0 | | | | |
| **East: Pakuranga Road (East)** | | | | | | | | | | | | | | | |
| Lane 1 | 722 | 4.0 | 660 | 4.2 | 1126 | 0.587 | 100 | 14.7 | LOS B | 9.5 | 69.1 | Full | 113 | 0.0 | 4.8 |
| Lane 2 | 420 | 8.3 | 385 | 8.6 | 504 | 0.764 | 100 | 55.6 | LOS E | 15.0[N4] | 113.0[N4] | Full | 113 | 0.0 | 50.0 |
| Lane 3 | 414 | 8.3 | 379 | 8.6 | 496[1] | 0.764 | 100 | 55.4 | LOS E | 15.0[N4] | 113.0[N4] | Full | 113 | 0.0 | 50.0 |
| Lane 4 (B) | 11 | 100.0 | 11 | 100.0 | 47 | 0.235 | 100 | 83.9 | LOS F | 0.5 | 6.9 | Short | 101 | 0.0 | NA |
| Approach | 1567 | 7.0 | 1436[N1] | 7.3 | | 0.764 | | 37.0 | LOS D | 15.0 | 113.0 | | | | |
| **West: Pakuranga Road (West)** | | | | | | | | | | | | | | | |
| Lane 1 (B) | 40 | 100.0 | 40 | 100.0 | 38 | 1.066 | 100 | 169.5 | LOS F | 2.9 | 38.3 | Full | 388 | -15.9[N7] | 0.0 |
| Lane 2 | 463 | 6.4 | 463 | 6.4 | 437 | 1.059 | 100 | 149.9 | LOS F | 35.0 | 258.6 | Short | 141 | -29.6[N3] | NA |
| Lane 3 | 458 | 6.4 | 458 | 6.4 | 432 | 1.059 | 100 | 150.2 | LOS F | 34.7 | 256.0 | Full | 388 | -30.4[N3] | 12.6[8] |
| Lane 4 | 526 | 6.4 | 526 | 6.4 | 497 | 1.059 | 100 | 147.0 | LOS F | 39.3 | 290.4 | Full | 388 | -20.0[N7] | 23.2 |
| Lane 5 | 180 | 7.5 | 180 | 7.5 | 222 | 0.807 | 100 | 72.2 | LOS E | 6.3 | 46.6 | Short | 184 | 0.0 | NA |
| Lane 6 | 180 | 7.5 | 180 | 7.5 | 222 | 0.807 | 100 | 72.2 | LOS E | 6.3 | 46.6 | Short | 109 | 0.0 | NA |
| Approach | 1845 | 8.7 | 1845 | 8.7 | | 1.066 | | 134.5 | LOS F | 39.3 | 290.4 | | | | |
| Intersection | 5537 | 7.0 | 5321[N1] | 7.3 | | 1.066 | | 98.4 | LOS F | 39.3 | 290.4 | | | | |

## 3.4 Ti Rakau Drive / SEART (Pakuranga HWY)

### 3.4.1 AM Peak

- Do-Min scenario performance is poor, LOS F in the AM peak.
- Stage 2 intersection performance is expected to be improved with lower delay but poorer DOS, LOS is E in the AM peak.
- The Ti Rakau Drive west approach right-turn into SEART is expected to operate at LOS E during the AM.

**Table 7: Ti Rakau Dr / SEART – Do-Min vs Stage 2 (AM)**

**Lane Use and Performance**

| | DEMAND FLOWS [ Total | HV ] | ARRIVAL FLOWS [ Total | HV ] | Cap. | Deg. Satn | Lane Util. | Aver. Delay | Level of Service | AVERAGE BACK OF QUEUE [ Veh | Dist ] | Lane Config | Lane Length | Cap. Adj. | Prob. Block. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | veh/h | % | veh/h | % | veh/h | v/c | % | sec | | | m | | m | % | % |
| **SouthEast: Ti Rakau Drive (East)** | | | | | | | | | | | | | | | |
| Lane 1 | 1735 | 9.7 | 1499 | 10.2 | 1677 | 0.894 | 100 | 464.6 | LOS F | 0.0 | 0.0 | Full | 91 | 0.0 | 0.0 |
| Lane 2 | 238 | 11.1 | 206 | 11.9 | 273 | 0.757 | 100 | 60.5 | LOS E | 8.1 | 62.6 | Full | 91 | 0.0 | 15.5 |
| Lane 3 | 240 | 11.1 | 208 | 11.9 | 276 | 0.757 | 100 | 60.4 | LOS E | 8.2 | 63.2 | Full | 91 | 0.0 | 16.4 |
| Lane 4 | 54 | 5.6 | 47 | 5.9 | 270 | 0.172 | 100 | 56.7 | LOS E | 1.6 | 11.7 | Full | 91 | 0.0 | 0.0 |
| Approach | 2267 | 9.9 | 1961[N1] | 10.5 | | 0.894 | | 369.5 | LOS F | 8.2 | 63.2 | | | | |
| **NorthEast: Reeves Road** | | | | | | | | | | | | | | | |
| Lane 1 | 240 | 6.8 | 228 | 6.5 | 255[1] | 0.894 | 100 | 71.8 | LOS E | 9.7[N4] | 72.0[N4] | Short | 52 | 0.0 | NA |
| Lane 2 | 253 | 5.8 | 240 | 5.5 | 268[1] | 0.894 | 100 | 71.0 | LOS E | 9.8[N4] | 72.0[N4] | Full | 72 | 0.0 | 50.0[8] |
| Lane 3 | 26 | 3.8 | 25 | 3.7 | 83 | 0.299 | 100 | 73.6 | LOS E | 1.0 | 7.2 | Short | 16 | 0.0 | NA |
| Approach | 519 | 6.2 | 493[N1] | 5.9 | | 0.894 | | 71.5 | LOS E | 9.8 | 72.0 | | | | |
| **NorthWest: Ti Rakau Drive (West)** | | | | | | | | | | | | | | | |
| Lane 1 | 251 | 20.7 | 235 | 21.4 | 605 | 0.389 | 45[5] | 33.4 | LOS C | 6.8 | 56.0 | Full | 84 | 0.0 | 12.5 |
| Lane 2 | 610 | 5.0 | 568 | 5.1 | 651 | 0.872 | 100 | 54.9 | LOS D | 11.5[N4] | 84.0[N4] | Full | 84 | 0.0 | 50.0 |
| Lane 3 | 594 | 5.0 | 553 | 5.1 | 634 | 0.872 | 100 | 55.3 | LOS E | 11.5[N4] | 84.0[N4] | Full | 84 | 0.0 | 50.0 |
| Approach | 1455 | 7.7 | 1356[N1] | 7.9 | | 0.872 | | 51.3 | LOS D | 11.5 | 84.0 | | | | |
| **SouthWest: Pakuranga HWY** | | | | | | | | | | | | | | | |
| Lane 1 | 268 | 4.6 | 268 | 4.6 | 1189 | 0.226 | 100 | 16.8 | LOS B | 4.1 | 29.5 | Short | 308 | 0.0 | NA |
| Lane 2 | 273 | 4.6 | 273 | 4.6 | 1208 | 0.226 | 100 | 16.8 | LOS B | 4.1 | 29.9 | Short | 132 | 0.0 | NA |
| Lane 3 | 155 | 11.0 | 155 | 11.0 | 455 | 0.341 | 100 | 46.3 | LOS D | 4.9 | 37.7 | Full | 1650 | 0.0 | 0.0 |
| Lane 4 | 217 | 7.3 | 217 | 7.3 | 257 | 0.847 | 100 | 74.3 | LOS E | 9.2 | 68.1 | Full | 1650 | 0.0 | 0.0 |
| Lane 5 | 220 | 7.3 | 220 | 7.3 | 259 | 0.847 | 100 | 74.3 | LOS E | 9.2 | 68.7 | Short | 277 | 0.0 | NA |
| Approach | 1133 | 6.5 | 1133 | 6.5 | | 0.847 | | 43.0 | LOS D | 9.2 | 68.7 | | | | |
| Intersection | 5374 | 8.2 | 4943[N1] | 9.0 | | 0.894 | | 177.6 | LOS F | 11.5 | 84.0 | | | | |

**Lane Use and Performance**

| | DEMAND FLOWS [ Total | HV ] | ARRIVAL FLOWS [ Total | HV ] | Cap. | Deg. Satn | Lane Util. | Aver. Delay | Level of Service | AVERAGE BACK OF QUEUE [ Veh | Dist ] | Lane Config | Lane Length | Cap. Adj. | Prob. Block. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | veh/h | % | veh/h | % | veh/h | v/c | % | sec | | | m | | m | % | % |
| **SouthEast: Ti Rakau Drive (East)** | | | | | | | | | | | | | | | |
| Lane 1 | 1662 | 9.2 | 1235 | 9.3 | 1688 | 0.732 | 100 | 53.1 | LOS D | 0.0 | 0.0 | Full | 91 | 0.0 | 0.0 |
| Lane 2 | 308 | 11.3 | 229 | 11.6 | 260 | 0.882 | 100 | 86.0 | LOS F | 11.8[N4] | 91.0[N4] | Full | 91 | 0.0 | 50.0 |
| Lane 3 | 311 | 11.3 | 232 | 11.6 | 263 | 0.882 | 100 | 85.9 | LOS F | 11.8[N4] | 91.0[N4] | Full | 91 | 0.0 | 50.0 |
| Approach | 2281 | 9.8 | 1696[N1] | 9.9 | | 0.882 | | 62.0 | LOS E | 11.8 | 91.0 | | | | |
| **NorthWest: Ti Rakau Drive (West)** | | | | | | | | | | | | | | | |
| Lane 1 | 198 | 24.2 | 186 | 24.8 | 588 | 0.316 | 35[5] | 41.0 | LOS D | 6.5 | 55.5 | Full | 84 | 0.0 | 11.8 |
| Lane 2 | 620 | 5.0 | 577 | 5.1 | 637 | 0.905 | 100 | 71.9 | LOS E | 11.5[N4] | 84.0[N4] | Full | 84 | 0.0 | 50.0 |
| Lane 3 | 604 | 5.0 | 562 | 5.1 | 621 | 0.905 | 100 | 72.5 | LOS E | 11.5[N4] | 84.0[N4] | Full | 84 | 0.0 | 50.0 |
| Approach | 1422 | 7.7 | 1324[N1] | 7.8 | | 0.905 | | 67.8 | LOS E | 11.5 | 84.0 | | | | |
| **SouthWest: Pakuranga HWY** | | | | | | | | | | | | | | | |
| Lane 1 | 354 | 5.2 | 354 | 5.2 | 1398 | 0.253 | 100 | 12.8 | LOS B | 4.6 | 33.6 | Short | 308 | 0.0 | NA |
| Lane 2 | 359 | 5.2 | 359 | 5.2 | 1420 | 0.253 | 100 | 12.8 | LOS B | 4.7 | 34.1 | Short | 132 | 0.0 | NA |
| Lane 3 | 385 | 8.4 | 385 | 8.4 | 431 | 0.893 | 100 | 84.5 | LOS F | 20.6 | 154.4 | Full | 1650 | 0.0 | 0.0 |
| Lane 4 | 389 | 8.4 | 389 | 8.4 | 436 | 0.893 | 100 | 84.3 | LOS F | 20.8 | 155.8 | Full | 1650 | 0.0 | 0.0 |
| Approach | 1487 | 6.9 | 1487 | 6.9 | | 0.893 | | 50.1 | LOS D | 20.8 | 155.8 | | | | |
| Intersection | 5190 | 8.4 | 4507[N1] | 9.6 | | 0.905 | | 59.8 | LOS E | 20.8 | 155.8 | | | | |

Eastern Busway Alliance

Fletcher | acciona | AECOM | Jacobs

### 3.4.2 PM Peak

- Similar to the AM, the Do-Min intersection performance is poor (LOS F). The intersection performance is also expected to be poor during the Stage 2 detour.
- The SEART right-turn lanes into Ti Rakau Drive are expected to operate at LOS F during the PM. The increase in demand (due to Reeves Road closure) results in delay increasing from around 50 sec to 215 sec (3.6 min), which would require mitigation.

**Table 8: Ti Rakau Dr / SEART – Do-Min vs Stage 2 (PM)**

Lane Use and Performance

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | AVERAGE BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SouthEast: Ti Rakau Drive (East)** | | | | | | | | | | | | | | | |
| Lane 1 | 862 | 8.9 | 821 | 8.6 | 1695 | 0.484 | 100 | 6.0 | LOS A | 0.0 | 0.0 | Full | 91 | 0.0 | 0.0 |
| Lane 2 | 173 | 6.9 | 166 | 6.8 | 165 | 1.003 | 100 | 137.4 | LOS F | 11.8 | 87.7 | Full | 91 | -50.0[N7] | 46.5 |
| Lane 3 | 351 | 6.9 | 335 | 6.8 | 334 | 1.003 | 100 | 123.3 | LOS F | 12.3[N4] | 91.0[N4] | Full | 91 | 0.0 | 50.0 |
| Lane 4 | 192 | 3.1 | 183 | 3.0 | 162 | 1.132 | 100 | 226.2 | LOS F | 12.7[N4] | 91.0[N4] | Full | 91 | -49.9[N7] | 50.0 |
| Approach | 1578 | 7.5 | 1505[N1] | 7.3 | | 1.132 | | 73.4 | LOS E | 12.7 | 91.0 | | | | |
| **NorthEast: Reeves Road** | | | | | | | | | | | | | | | |
| Lane 1 | 187 | 8.3 | 178 | 7.9 | 249[1] | 0.718 | 100 | 75.4 | LOS E | 8.5 | 63.9 | Short | 52 | 0.0 | NA |
| Lane 2 | 175 | 11.1 | 167 | 10.5 | 233[1] | 0.718 | 100 | 75.3 | LOS E | 8.1 | 61.8 | Full | 72 | 0.0 | 38.8[8] |
| Lane 3 | 34 | 14.7 | 32 | 14.0 | 60 | 0.535 | 100 | 96.0 | LOS F | 1.7 | 13.4 | Short | 16 | 0.0 | NA |
| Approach | 396 | 10.1 | 378[N1] | 9.6 | | 0.718 | | 77.1 | LOS E | 8.5 | 63.9 | | | | |
| **NorthWest: Ti Rakau Drive (West)** | | | | | | | | | | | | | | | |
| Lane 1 | 332 | 10.3 | 305 | 10.5 | 267 | 1.145 | 100 | 222.0 | LOS F | 11.0[N4] | 84.0[N4] | Full | 84 | 0.0 | 50.0 |
| Lane 2 | 341 | 5.0 | 313 | 5.3 | 273 | 1.145 | 100 | 225.0 | LOS F | 11.5[N4] | 84.0[N4] | Full | 84 | 0.0 | 50.0 |
| Lane 3 | 331 | 4.4 | 304 | 4.6 | 265 | 1.145 | 100 | 226.2 | LOS F | 11.5[N4] | 84.0[N4] | Full | 84 | 0.0 | 50.0 |
| Approach | 1004 | 6.6 | 922[N1] | 6.8 | | 1.145 | | 224.4 | LOS F | 11.5 | 84.0 | | | | |
| **SouthWest: Pakuranga HWY** | | | | | | | | | | | | | | | |
| Lane 1 | 1029 | 4.0 | 1029 | 4.0 | 1218 | 0.844 | 100 | 29.1 | LOS C | 37.7 | 272.7 | Short | 308 | 0.0 | NA |
| Lane 2 | 522 | 4.0 | 522 | 4.0 | 619 | 0.844 | 100 | 38.0 | LOS D | 21.8 | 158.1 | Short | 132 | -50.0[N7] | NA |
| Lane 3 | 547 | 9.7 | 547 | 9.7 | 475[1] | 1.152 | 100 | 227.4 | LOS F | 54.0 | 409.1 | Full | 1650 | -33.3[N7] | 0.0 |
| Lane 4 | 476 | 6.9 | 476 | 6.9 | 679 | 0.700 | 100 | 53.1 | LOS D | 19.6 | 145.4 | Full | 1650 | 0.0 | 0.0 |
| Lane 5 | 480 | 6.9 | 480 | 6.9 | 686 | 0.700 | 100 | 53.1 | LOS D | 19.8 | 146.9 | Short | 277 | 0.0 | NA |
| Approach | 3054 | 5.9 | 3054 | 5.9 | | 1.152 | | 73.6 | LOS E | 54.0 | 409.1 | | | | |
| Intersection | 6032 | 6.7 | 5859[N1] | 6.9 | | 1.152 | | 97.5 | LOS F | 54.0 | 409.1 | | | | |

Lane Use and Performance

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | AVERAGE BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SouthEast: Ti Rakau Drive (East)** | | | | | | | | | | | | | | | |
| Lane 1 | 961 | 8.3 | 885 | 8.1 | 1702 | 0.520 | 100 | 6.3 | LOS A | 0.0 | 0.0 | Full | 91 | 0.0 | 0.0 |
| Lane 2 | 288 | 7.9 | 266 | 7.9 | 241 | 1.105 | 100 | 199.1 | LOS F | 12.2[N4] | 91.0[N4] | Full | 91 | -50.0[N7] | 50.0 |
| Lane 3 | 319 | 7.9 | 294 | 7.9 | 266 | 1.105 | 100 | 197.0 | LOS F | 12.2[N4] | 91.0[N4] | Full | 91 | -45.3[N7] | 50.0 |
| Approach | 1568 | 8.2 | 1445[N1] | 8.0 | | 1.105 | | 80.6 | LOS F | 12.2 | 91.0 | | | | |
| **NorthWest: Ti Rakau Drive (West)** | | | | | | | | | | | | | | | |
| Lane 1 | 406 | 8.7 | 378 | 8.5 | 341 | 1.106 | 100 | 190.1 | LOS F | 11.2[N4] | 84.0[N4] | Full | 84 | 0.0 | 50.0 |
| Lane 2 | 396 | 6.5 | 369 | 6.7 | 333 | 1.106 | 100 | 194.8 | LOS F | 11.3[N4] | 84.0[N4] | Full | 84 | 0.0 | 50.0 |
| Lane 3 | 385 | 6.4 | 359 | 6.7 | 324 | 1.106 | 100 | 195.4 | LOS F | 11.4[N4] | 84.0[N4] | Full | 84 | 0.0 | 50.0 |
| Approach | 1188 | 7.2 | 1105[N1] | 7.3 | | 1.106 | | 193.4 | LOS F | 11.4 | 84.0 | | | | |
| **SouthWest: Pakuranga HWY** | | | | | | | | | | | | | | | |
| Lane 1 | 1031 | 4.7 | 1031 | 4.7 | 1191 | 0.866 | 100 | 30.9 | LOS C | 39.5 | 287.7 | Short | 308 | 0.0 | NA |
| Lane 2 | 508 | 4.7 | 508 | 4.7 | 587 | 0.866 | 100 | 44.5 | LOS D | 22.7 | 165.1 | Short | 132 | -50.0[N7] | NA |
| Lane 3 | 488 | 7.6 | 488 | 7.6 | 431[1] | 1.132 | 100 | 216.1 | LOS F | 44.3 | 330.3 | Full | 1650 | 0.0 | 0.0 |
| Lane 4 | 598 | 7.6 | 598 | 7.6 | 528 | 1.132 | 100 | 212.7 | LOS F | 53.8 | 400.7 | Full | 1650 | 0.0 | 0.0 |
| Approach | 2625 | 5.9 | 2625 | 5.9 | | 1.132 | | 109.4 | LOS F | 53.8 | 400.7 | | | | |
| Intersection | 5381 | 6.8 | 5175[N1] | 7.1 | | 1.132 | | 119.3 | LOS F | 53.8 | 400.7 | | | | |

### 3.4.3 Mitigation 1

- Mitigation 1, to remedy the Ti Rakau Drive / SEART intersection during the PM peak, includes converting the through lane from SEART to Reeves Road to a right-turn lane (note Reeves Road is closed during Stage 2), thus providing a 3rd lane for this turning movement onto Ti Rakau Drive eastbound.
- In addition, a 3rd exit lane is proposed on Ti Rakau Drive eastbound between the SEART intersection and the newly completed William Roberts Road intersection. The proposed layout is shown below.
- As stated in **Section 3.3** above, it is expected that the Pakuranga Road / Ti Rakau Drive intersection performance during the PM peak would also be improved as demand would be drawn away from that intersection to the Ti Rakau Drive / SEART intersection, which could have more spare capacity.

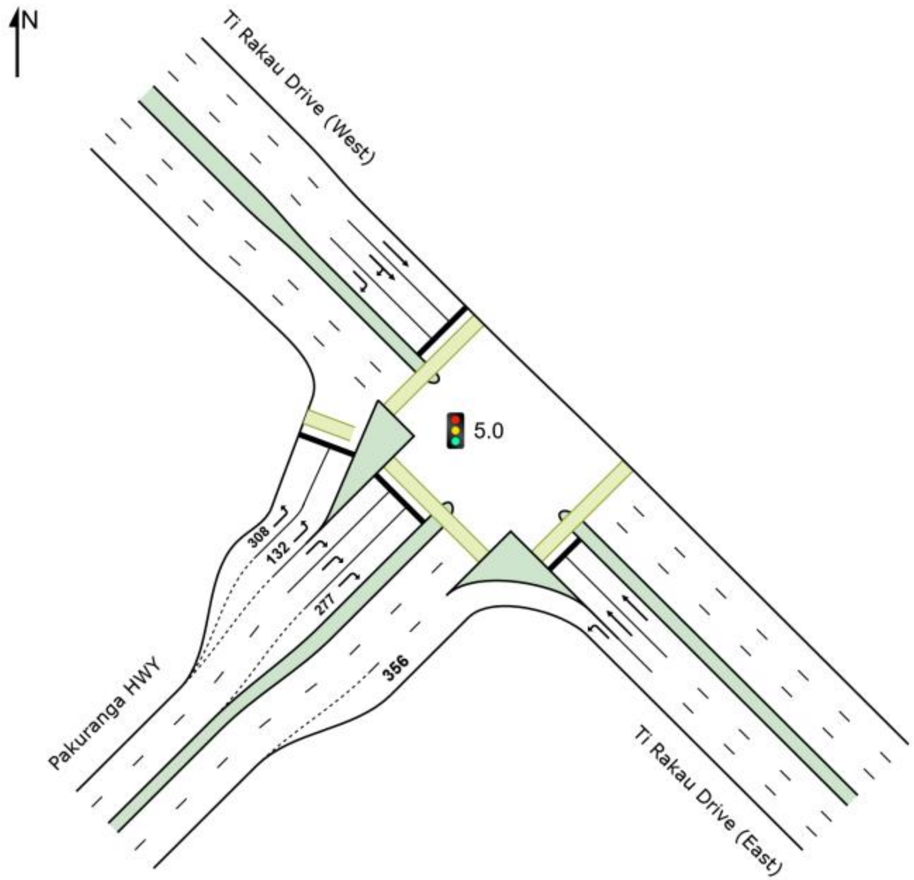



**Figure 3: Ti Rakau Dr / SEART - Mitigation 1 proposed layout**

- The Stage 2 intersection performance (without mitigation) is expected to be poor (LOS F), especially in the SEART right-turn lanes into Ti Rakau Drive where delay increases from around 50 sec in the Do-Min scenario, to 215 sec (3.6 min).
- With the measures in place proposed under Mitigation 1, intersection performance during the detour is expected to improve to LOS E, with an average delay of 70 sec. This is also an improvement compared to the Do-Min scenario (LOS F and delay of 98 sec)
- Delay and queue lengths in the SEART right-turn lanes are improved under Mitigation 1 (delay of 85 sec and average queue length of 145 m), compared to the Stage 2 detour.

**Table 9: Ti Rakau Dr / SEART – Stage 2 vs Mitigation 1 (PM)**

Lane Use and Performance (Stage 2)

| | DEMAND FLOWS [Total veh/h | HV] % | ARRIVAL FLOWS [Total veh/h | HV] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | AVERAGE BACK OF QUEUE [Veh | Dist] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SouthEast: Ti Rakau Drive (East)** | | | | | | | | | | | | | | | |
| Lane 1 | 961 | 8.3 | 885 | 8.1 | 1702 | 0.520 | 100 | 6.3 | LOS A | 0.0 | 0.0 | Full | 91 | 0.0 | 0.0 |
| Lane 2 | 288 | 7.9 | 266 | 7.9 | 241 | 1.105 | 100 | 199.1 | LOS F | 12.2[N4] | 91.0[N4] | Full | 91 | -50.0[N7] | 50.0 |
| Lane 3 | 319 | 7.9 | 294 | 7.9 | 266 | 1.105 | 100 | 197.0 | LOS F | 12.2[N4] | 91.0[N4] | Full | 91 | -45.3[N7] | 50.0 |
| Approach | 1568 | 8.2 | 1445[N1] | 8.0 | | 1.105 | | 80.6 | LOS F | 12.2 | 91.0 | | | | |
| **NorthWest: Ti Rakau Drive (West)** | | | | | | | | | | | | | | | |
| Lane 1 | 406 | 8.7 | 378 | 8.5 | 341 | 1.106 | 100 | 190.1 | LOS F | 11.2[N4] | 84.0[N4] | Full | 84 | 0.0 | 50.0 |
| Lane 2 | 396 | 6.5 | 369 | 6.7 | 333 | 1.106 | 100 | 194.8 | LOS F | 11.3[N4] | 84.0[N4] | Full | 84 | 0.0 | 50.0 |
| Lane 3 | 385 | 6.4 | 359 | 6.7 | 324 | 1.106 | 100 | 195.4 | LOS F | 11.4[N4] | 84.0[N4] | Full | 84 | 0.0 | 50.0 |
| Approach | 1188 | 7.2 | 1105[N1] | 7.3 | | 1.106 | | 193.4 | LOS F | 11.4 | 84.0 | | | | |
| **SouthWest: Pakuranga HWY** | | | | | | | | | | | | | | | |
| Lane 1 | 1031 | 4.7 | 1031 | 4.7 | 1191 | 0.866 | 100 | 30.9 | LOS C | 39.5 | 287.7 | Short | 308 | 0.0 | NA |
| Lane 2 | 508 | 4.7 | 508 | 4.7 | 587 | 0.866 | 100 | 44.5 | LOS D | 22.7 | 165.1 | Short | 132 | -50.0[N7] | NA |
| Lane 3 | 488 | 7.6 | 488 | 7.6 | 431 | 1.132 | 100 | 216.1 | LOS F | 44.3 | 330.3 | Full | 1650 | 0.0 | 0.0 |
| Lane 4 | 598 | 7.6 | 598 | 7.6 | 528 | 1.132 | 100 | 212.7 | LOS F | 53.8 | 400.7 | Full | 1650 | 0.0 | 0.0 |
| Approach | 2625 | 5.9 | 2625 | 5.9 | | 1.132 | | 109.4 | LOS F | 53.8 | 400.7 | | | | |
| Intersection | 5381 | 6.8 | 5175[N1] | 7.1 | | 1.132 | | 119.3 | LOS F | 53.8 | 400.7 | | | | |

Lane Use and Performance (Mitigation 1)

| | DEMAND FLOWS [Total veh/h | HV] % | ARRIVAL FLOWS [Total veh/h | HV] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | AVERAGE BACK OF QUEUE [Veh | Dist] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SouthEast: Ti Rakau Drive (East)** | | | | | | | | | | | | | | | |
| Lane 1 | 961 | 8.3 | 885 | 8.1 | 1702 | 0.520 | 100 | 6.6 | LOS A | 0.0 | 0.0 | Full | 91 | 0.0 | 0.0 |
| Lane 2 | 288 | 7.9 | 266 | 7.9 | 252 | 1.057 | 100 | 165.1 | LOS F | 12.2[N4] | 91.0[N4] | Full | 91 | -50.0[N7] | 50.0 |
| Lane 3 | 319 | 7.9 | 294 | 7.9 | 278 | 1.057 | 100 | 162.8 | LOS F | 12.2[N4] | 91.0[N4] | Full | 91 | -45.3[N7] | 50.0 |
| Approach | 1568 | 8.2 | 1445[N1] | 8.0 | | 1.057 | | 67.6 | LOS E | 12.2 | 91.0 | | | | |
| **NorthWest: Ti Rakau Drive (West)** | | | | | | | | | | | | | | | |
| Lane 1 | 406 | 8.7 | 378 | 8.5 | 397 | 0.952 | 100 | 96.9 | LOS F | 11.2[N4] | 84.0[N4] | Full | 84 | 0.0 | 50.0 |
| Lane 2 | 396 | 6.5 | 369 | 6.7 | 387 | 0.952 | 100 | 101.6 | LOS F | 11.3[N4] | 84.0[N4] | Full | 84 | 0.0 | 50.0 |
| Lane 3 | 385 | 6.4 | 359 | 6.7 | 376 | 0.952 | 100 | 102.4 | LOS F | 11.4[N4] | 84.0[N4] | Full | 84 | 0.0 | 50.0 |
| Approach | 1188 | 7.2 | 1105[N1] | 7.3 | | 0.952 | | 100.2 | LOS F | 11.4 | 84.0 | | | | |
| **SouthWest: Pakuranga HWY** | | | | | | | | | | | | | | | |
| Lane 1 | 1029 | 4.7 | 1029 | 4.7 | 1169 | 0.880 | 100 | 32.5 | LOS C | 40.7 | 296.6 | Short | 308 | 0.0 | NA |
| Lane 2 | 510 | 4.7 | 510 | 4.7 | 580 | 0.880 | 100 | 50.0 | LOS D | 24.4 | 177.3 | Short | 132 | -50.0[N7] | NA |
| Lane 3 | 359 | 7.6 | 359 | 7.6 | 408 | 0.882 | 100 | 84.8 | LOS F | 19.2 | 142.8 | Full | 1650 | 0.0 | 0.0 |
| Lane 4 | 363 | 7.6 | 363 | 7.6 | 412 | 0.882 | 100 | 84.7 | LOS F | 19.3 | 144.1 | Full | 1650 | 0.0 | 0.0 |
| Lane 5 | 363 | 7.6 | 363 | 7.6 | 412 | 0.882 | 100 | 84.7 | LOS F | 19.3 | 144.1 | Short | 277 | 0.0 | NA |
| Approach | 2625 | 5.9 | 2625 | 5.9 | | 0.882 | | 57.5 | LOS E | 40.7 | 296.6 | | | | |
| Intersection | 5381 | 6.8 | 5175[N1] | 7.1 | | 1.057 | | 69.4 | LOS E | 40.7 | 296.6 | | | | |

- A further refinement of Mitigation 1 was also tested. It consisted of a 105 m short exit lane (AGRD04A (Austroads) – Table 5.5) on Ti Rakau Drive eastbound. Although intersection performance is expected to be similar to Mitigation 1 above, this geometric change would provide insufficient weave distance up to William Roberts Road and is not recommended.
- The construction costs of and effort to implement the measures proposed under Mitigation 1 are potentially considerable. Mitigation 1 could require the buildout of the southern side of Ti Rakau Drive and the relocation of the centreline in order to provide the additional exit lane along Ti Rakau Drive eastbound.
- Therefore, alternative measures are proposed under Mitigation 2.

### 3.4.4 Mitigation 2

- Mitigation 2 includes the temporary removal of the pedestrian crossing on the eastern arm of the Ti Rakau Drive / SEART intersection, thus reducing signal phasing down to 3 phases and allowing for more greentime to be allocated to the SEART right-turn movements into Ti Rakau Drive eastbound during the PM peak.
- It is noted that pedestrian amenity at this intersection would be temporarily reduced, however the intersection would still provide the ability to cross Ti Rakau Drive from all directions, albeit with some increase in travel time and distance.  The pedestrian crossing would be reinstated in the final build-out of the intersection.
- The proposed layout is shown below.

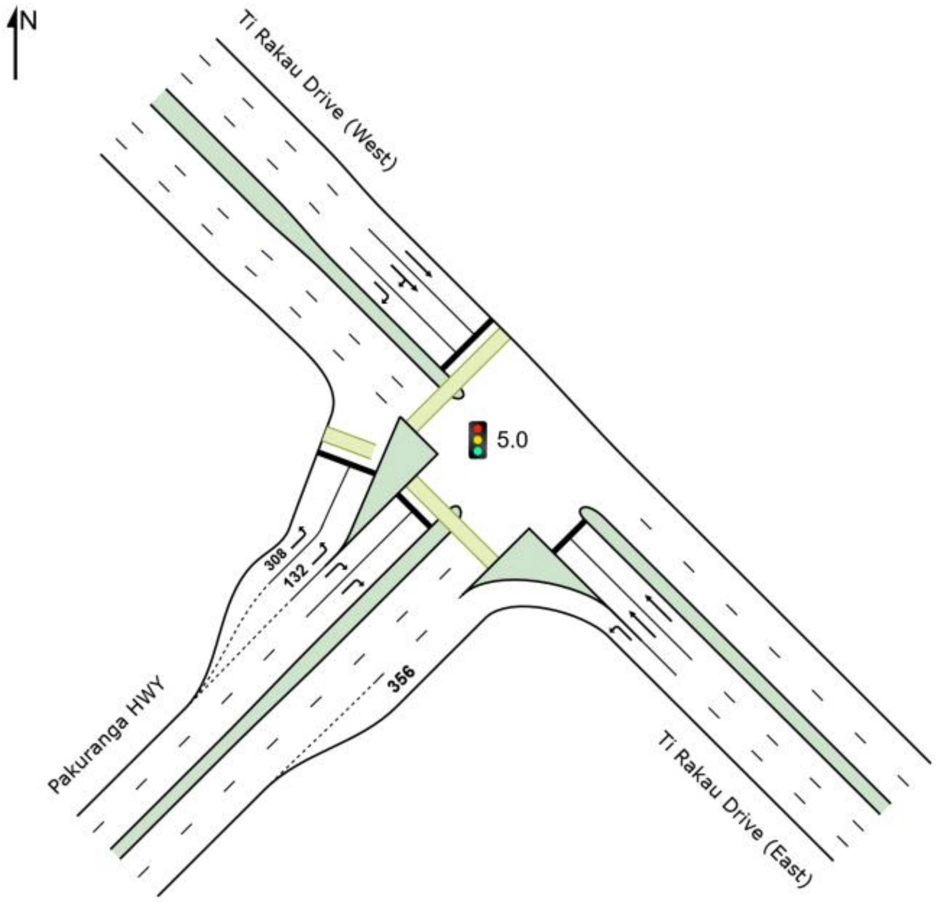



**Figure 4: Ti Rakau Dr / SEART - Mitigation 2 proposed layout**

- Again, the Stage 2 intersection performance (without mitigation) is expected to be poor (LOS F), especially in the SEART right-turn lanes into Ti Rakau Drive where delay increases from around 50 sec in the Do-Min scenario, to 215 sec (3.6 min).
- With the measures in place proposed under Mitigation 2, intersection performance during the detour is expected to improve to LOS E, with an average delay of 78 sec. This is also an improvement compared to the Do-Min scenario (LOS F and delay of 98 sec).
- Delay and queue lengths in the SEART right-turn lanes are improved under Mitigation 2 (delay of 92 sec and average queue length of 280 m), compared to the Stage 2 detour. However, these are still larger than the Do-Min scenario.

**Table 10: Ti Rakau Dr / SEART – Stage 2 vs Mitigation 2 (PM)**

**Lane Use and Performance**

| | DEMAND FLOWS [Total | HV] | ARRIVAL FLOWS [Total | HV] | Cap. | Deg. Satn | Lane Util. | Aver. Delay | Level of Service | AVERAGE BACK OF QUEUE [Veh | Dist] | Lane Config | Lane Length | Cap. Adj. | Prob. Block. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | veh/h | % | veh/h | % | veh/h | v/c | % | sec | | | m | | m | % | % |
| **SouthEast: Ti Rakau Drive (East)** | | | | | | | | | | | | | | | |
| Lane 1 | 961 | 8.3 | 885 | 8.1 | 1702 | 0.520 | 100 | 6.3 | LOS A | 0.0 | 0.0 | Full | 91 | 0.0 | 0.0 |
| Lane 2 | 288 | 7.9 | 266 | 7.9 | 241 | 1.105 | 100 | 199.1 | LOS F | 12.2[N4] | 91.0[N4] | Full | 91 | -50.0[N7] | 50.0 |
| Lane 3 | 319 | 7.9 | 294 | 7.9 | 266 | 1.105 | 100 | 197.0 | LOS F | 12.2[N4] | 91.0[N4] | Full | 91 | -45.3[N7] | 50.0 |
| Approach | 1568 | 8.2 | 1445[N1] | 8.0 | | 1.105 | | 80.6 | LOS F | 12.2 | 91.0 | | | | |
| **NorthWest: Ti Rakau Drive (West)** | | | | | | | | | | | | | | | |
| Lane 1 | 406 | 8.7 | 378 | 8.5 | 341 | 1.106 | 100 | 190.1 | LOS F | 11.2[N4] | 84.0[N4] | Full | 84 | 0.0 | 50.0 |
| Lane 2 | 396 | 6.5 | 369 | 6.7 | 333 | 1.106 | 100 | 194.8 | LOS F | 11.3[N4] | 84.0[N4] | Full | 84 | 0.0 | 50.0 |
| Lane 3 | 385 | 6.4 | 359 | 6.7 | 324 | 1.106 | 100 | 195.4 | LOS F | 11.4[N4] | 84.0[N4] | Full | 84 | 0.0 | 50.0 |
| Approach | 1188 | 7.2 | 1105[N1] | 7.3 | | 1.106 | | 193.4 | LOS F | 11.4 | 84.0 | | | | |
| **SouthWest: Pakuranga HWY** | | | | | | | | | | | | | | | |
| Lane 1 | 1031 | 4.7 | 1031 | 4.7 | 1191 | 0.866 | 100 | 30.9 | LOS C | 39.5 | 287.7 | Short | 308 | 0.0 | NA |
| Lane 2 | 508 | 4.7 | 508 | 4.7 | 587 | 0.866 | 100 | 44.5 | LOS D | 22.7 | 165.1 | Short | 132 | -50.0[N7] | NA |
| Lane 3 | 488 | 7.6 | 488 | 7.6 | 431[1] | 1.132 | 100 | 216.1 | LOS F | 44.3 | 330.3 | Full | 1650 | 0.0 | 0.0 |
| Lane 4 | 598 | 7.6 | 598 | 7.6 | 528 | 1.132 | 100 | 212.7 | LOS F | 53.8 | 400.7 | Full | 1650 | 0.0 | 0.0 |
| Approach | 2625 | 5.9 | 2625 | 5.9 | | 1.132 | | 109.4 | LOS F | 53.8 | 400.7 | | | | |
| Intersection | 5381 | 6.8 | 5175[N1] | 7.1 | | 1.132 | | 119.3 | LOS F | 53.8 | 400.7 | | | | |

**Lane Use and Performance**

| | DEMAND FLOWS [Total | HV] | ARRIVAL FLOWS [Total | HV] | Cap. | Deg. Satn | Lane Util. | Aver. Delay | Level of Service | AVERAGE BACK OF QUEUE [Veh | Dist] | Lane Config | Lane Length | Cap. Adj. | Prob. Block. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | veh/h | % | veh/h | % | veh/h | v/c | % | sec | | | m | | m | % | % |
| **SouthEast: Ti Rakau Drive (East)** | | | | | | | | | | | | | | | |
| Lane 1 | 961 | 8.3 | 885 | 8.1 | 1702 | 0.520 | 100 | 6.6 | LOS A | 0.0 | 0.0 | Full | 91 | 0.0 | 0.0 |
| Lane 2 | 289 | 7.9 | 266 | 7.9 | 274 | 0.973 | 100 | 115.0 | LOS F | 12.2[N4] | 91.0[N4] | Full | 91 | -50.0[N7] | 50.0 |
| Lane 3 | 318 | 7.9 | 294 | 7.9 | 302 | 0.973 | 100 | 112.7 | LOS F | 12.2[N4] | 91.0[N4] | Full | 91 | -45.4[N7] | 50.0 |
| Approach | 1568 | 8.2 | 1445[N1] | 8.0 | | 0.973 | | 48.1 | LOS D | 12.2 | 91.0 | | | | |
| **NorthWest: Ti Rakau Drive (West)** | | | | | | | | | | | | | | | |
| Lane 1 | 406 | 8.7 | 378 | 8.5 | 397 | 0.954 | 100 | 97.4 | LOS F | 11.2[N4] | 84.0[N4] | Full | 84 | 0.0 | 50.0 |
| Lane 2 | 396 | 6.5 | 369 | 6.7 | 387 | 0.954 | 100 | 102.2 | LOS F | 11.3[N4] | 84.0[N4] | Full | 84 | 0.0 | 50.0 |
| Lane 3 | 385 | 6.4 | 359 | 6.7 | 376 | 0.954 | 100 | 102.9 | LOS F | 11.4[N4] | 84.0[N4] | Full | 84 | 0.0 | 50.0 |
| Approach | 1188 | 7.2 | 1106[N1] | 7.3 | | 0.954 | | 100.8 | LOS F | 11.4 | 84.0 | | | | |
| **SouthWest: Pakuranga HWY** | | | | | | | | | | | | | | | |
| Lane 1 | 1040 | 4.7 | 1040 | 4.7 | 1067[1] | 0.974 | 100 | 70.3 | LOS E | 59.0 | 429.6 | Short | 308 | 0.0 | NA |
| Lane 2 | 499 | 4.7 | 499 | 4.7 | 513[1] | 0.974 | 100 | 95.2 | LOS F | 31.6 | 230.2 | Short | 132 | -50.0[N7] | NA |
| Lane 3 | 460 | 7.6 | 460 | 7.6 | 481[1] | 0.956 | 100 | 91.8 | LOS F | 26.0 | 193.9 | Full | 1650 | 0.0 | 0.0 |
| Lane 4 | 626 | 7.6 | 626 | 7.6 | 655 | 0.956 | 100 | 91.1 | LOS F | 37.6 | 280.4 | Full | 1650 | 0.0 | 0.0 |
| Approach | 2625 | 5.9 | 2625 | 5.9 | | 0.974 | | 83.7 | LOS F | 59.0 | 429.6 | | | | |
| Intersection | 5381 | 6.8 | 5176[N1] | 7.1 | | 0.974 | | 77.4 | LOS E | 59.0 | 429.6 | | | | |

- The construction costs of and effort to implement the measures proposed under Mitigation 2 are considered more economically viable, compared to Mitigation 1. The measure would include minor road marking removal, signal head amendments and signal phasing adjustments. However, large queues are still expected in the SEART right-turn lanes. <u>Therefore, it is recommended that Mitigation 1 be discussed with key stakeholders.</u>

## 3.5 Ti Rakau Drive / Gossamer Drive

### 3.5.1 AM Peak

- The relatively low increase in traffic demand on the right-turn from Reeves Road to William Roberts (**Section 3.1**) indicated that traffic would be diverting to other links in the network. **Section 4.0** below provides further detail to this, but in summary, traffic demand is expected to detour from Gossamer Drive, north to Pakuranga Road and south Ti Rakau Drive.
- As a result, more demand would be experienced on the turning movements into Pakuranga Road and Ti Rakau Drive at these intersections. The Gossamer Drive left-turn into Pakuranga Road is expected to experience an increase of around 40 veh/h only, and was therefore not analysed.
- However, the right-turn from Gossamer Drive into Ti Rakau Drive is expected to increase by around 160 veh/h. The resultant intersection performance is poor (LOS F) for the Stage 2 AM peak, compared to the LOS E of the Do-Min scenario. This may require mitigation.

**Table 11: Ti Rakau Dr / Gossamer Dr – Do-Min vs Stage 2 (AM)**

Lane Use and Performance (Do-Min)

| | DEMAND FLOWS [Total veh/h | HV] % | ARRIVAL FLOWS [Total veh/h | HV] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | AVERAGE BACK OF QUEUE [Veh | Dist] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Fremantle Place | | | | | | | | | | | | | | | |
| Lane 1 | 25 | 4.0 | 25 | 4.0 | 82 | 0.305 | 100 | 73.7 | LOS E | 1.0 | 7.3 | Short | 26 | 0.0 | NA |
| Lane 2 | 31 | 3.2 | 31 | 3.2 | 85 | 0.363 | 100 | 71.9 | LOS E | 1.3 | 9.0 | Full | 285 | 0.0 | 0.0 |
| Approach | 56 | 3.6 | 56 | 3.6 | | 0.363 | | 72.7 | LOS E | 1.3 | 9.0 | | | | |
| East: Ti Rakau Drive (East) | | | | | | | | | | | | | | | |
| Lane 1 | 866 | 11.2 | 866 | 11.2 | 1010 | 0.857 | 100 | 29.3 | LOS C | 29.7 | 227.8 | Full | 636 | 0.0 | 0.0 |
| Lane 2 | 827 | 11.3 | 827 | 11.3 | 964 [1] | 0.857 | 100 | 29.2 | LOS C | 28.1 | 215.6 | Full | 636 | 0.0 | 0.0 |
| Lane 3 | 47 | 8.4 | 47 | 8.4 | 318 | 0.147 | 23 [6] | 30.2 | LOS C | 0.9 | 6.8 | Short | 150 | 0.0 | NA |
| Lane 4 | 203 | 8.4 | 203 | 8.4 | 318 | 0.639 | 100 | 33.2 | LOS C | 4.4 | 33.2 | Short | 103 | 0.0 | NA |
| Approach | 1943 | 10.9 | 1943 | 10.9 | | 0.857 | | 29.7 | LOS C | 29.7 | 227.8 | | | | |
| North: Gossamer Drive | | | | | | | | | | | | | | | |
| Lane 1 | 1053 | 7.5 | 1053 | 7.5 | 1033 [1] | 1.020 | 100 | 87.5 | LOS F | 58.7 | 437.3 | Short | 30 | 0.0 | NA |
| Lane 2 | 100 | 8.0 | 100 | 8.0 | 268 | 0.374 | 100 | 58.3 | LOS E | 3.6 | 26.6 | Full | 1010 | 0.0 | 0.0 |
| Approach | 1153 | 7.5 | 1153 | 7.5 | | 1.020 | | 85.0 | LOS F | 58.7 | 437.3 | | | | |
| West: Ti Rakau Drive (West) | | | | | | | | | | | | | | | |
| Lane 1 | 428 | 10.2 | 360 | 10.4 | 701 | 0.514 | 100 | 33.7 | LOS C | 10.5 | 80.0 | Full | 479 | 0.0 | 0.0 |
| Lane 2 | 409 | 10.4 | 343 | 10.6 | 669 [1] | 0.514 | 100 | 32.6 | LOS C | 10.1 | 77.2 | Full | 479 | 0.0 | 0.0 |
| Lane 3 | 10 | 10.0 | 8 | 9.9 | 90 | 0.093 | 100 | 70.7 | LOS E | 0.3 | 2.5 | Short | 27 | 0.0 | NA |
| Approach | 847 | 10.3 | 712 [N1] | 10.5 | | 0.514 | | 33.6 | LOS C | 10.5 | 80.0 | | | | |
| Intersection | 3999 | 9.7 | 3864 [N1] | 10.0 | | 1.020 | | 47.5 | LOS D | 58.7 | 437.3 | | | | |

Lane Use and Performance (Stage 2)

| | DEMAND FLOWS [Total veh/h | HV] % | ARRIVAL FLOWS [Total veh/h | HV] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | AVERAGE BACK OF QUEUE [Veh | Dist] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Fremantle Place | | | | | | | | | | | | | | | |
| Lane 1 | 23 | 8.7 | 23 | 8.7 | 63 | 0.367 | 100 | 94.2 | LOS F | 1.2 | 8.9 | Short | 26 | 0.0 | NA |
| Lane 2 | 28 | 7.1 | 28 | 7.1 | 65 | 0.429 | 100 | 92.7 | LOS F | 1.4 | 10.8 | Full | 285 | 0.0 | 0.0 |
| Approach | 51 | 7.8 | 51 | 7.8 | | 0.429 | | 93.4 | LOS F | 1.4 | 10.8 | | | | |
| East: Ti Rakau Drive (East) | | | | | | | | | | | | | | | |
| Lane 1 | 832 | 10.3 | 832 | 10.3 | 680 | 1.224 | 100 | 272.4 | LOS F | 85.1 | 648.8 | Full | 636 | 0.0 | 51.9 |
| Lane 2 | 792 | 10.5 | 792 | 10.5 | 646 [1] | 1.224 | 100 | 277.1 | LOS F | 83.4 | 635.9 | Full | 636 | 0.0 | 50.0 |
| Lane 3 | 65 | 7.8 | 65 | 7.8 | 262 | 0.247 | 23 [6] | 41.4 | LOS D | 1.8 | 13.7 | Short | 150 | 0.0 | NA |
| Lane 4 | 282 | 7.8 | 282 | 7.8 | 262 | 1.075 | 100 | 137.8 | LOS F | 16.5 | 123.4 | Short | 103 | 0.0 | NA |
| Approach | 1971 | 9.9 | 1971 | 9.9 | | 1.224 | | 247.4 | LOS F | 85.1 | 648.8 | | | | |
| North: Gossamer Drive | | | | | | | | | | | | | | | |
| Lane 1 | 960 | 9.0 | 960 | 9.0 | 1066 [1] | 0.901 | 100 | 28.7 | LOS C | 30.7 | 231.8 | Short | 30 | 0.0 | NA |
| Lane 2 | 264 | 6.4 | 264 | 6.4 | 212 [1] | 1.246 | 100 | 319.1 | LOS F | 29.7 | 219.6 | Full | 1010 | 0.0 | 0.0 |
| Approach | 1224 | 8.4 | 1224 | 8.4 | | 1.246 | | 91.3 | LOS F | 30.7 | 231.8 | | | | |
| West: Ti Rakau Drive (West) | | | | | | | | | | | | | | | |
| Lane 1 | 523 | 11.8 | 432 | 11.6 | 451 | 0.958 | 100 | 98.1 | LOS F | 26.1 | 200.6 | Full | 479 | 0.0 | 0.0 |
| Lane 2 | 500 | 11.9 | 413 | 11.7 | 431 [1] | 0.958 | 100 | 96.7 | LOS F | 25.1 | 193.1 | Full | 479 | 0.0 | 0.0 |
| Lane 3 | 10 | 10.0 | 8 | 9.6 | 102 | 0.081 | 100 | 85.7 | LOS F | 0.4 | 3.0 | Short | 27 | 0.0 | NA |
| Approach | 1033 | 11.8 | 854 [N1] | 11.7 | | 0.958 | | 97.3 | LOS F | 26.1 | 200.6 | | | | |
| Intersection | 4279 | 9.9 | 4100 [N1] | 10.4 | | 1.246 | | 167.6 | LOS F | 85.1 | 648.8 | | | | |

### 3.5.2 PM Peak

- The intersection is expected to experience little change during the Stage 2 PM peak and will remain at LOS D.
- It is noted that an equivalent in traffic demand returning to this intersection, compared to AM peak, does not occur as expected in the Ti Rakau Drive west left-turn. This could be due to the completion of the William Roberts Road link to Ti Rakau Drive.

**Table 12: Ti Rakau Dr / Gossamer Dr – Do-Min vs Stage 2 (PM)**

Lane Use and Performance

| | DEMAND FLOWS [ Total | HV ] | ARRIVAL FLOWS [ Total | HV ] | Cap. | Deg. Satn | Lane Util. | Aver. Delay | Level of Service | AVERAGE BACK OF QUEUE [ Veh | Dist ] | Lane Config | Lane Length | Cap. Adj. | Prob. Block. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | veh/h | % | veh/h | % | veh/h | v/c | % | sec | | | m | | m | % | % |
| South: Fremantle Place | | | | | | | | | | | | | | | |
| Lane 1 | 12 | 0.0 | 12 | 0.0 | 64 | 0.187 | 100 | 95.8 | LOS F | 0.6 | 4.4 | Short | 26 | 0.0 | NA |
| Lane 2 | 27 | 3.7 | 27 | 3.7 | 65 | 0.418 | 100 | 95.8 | LOS F | 1.4 | 10.4 | Full | 285 | 0.0 | 0.0 |
| Approach | 39 | 2.6 | 39 | 2.6 | | 0.418 | | 95.8 | LOS F | 1.4 | 10.4 | | | | |
| East: Ti Rakau Drive (East) | | | | | | | | | | | | | | | |
| Lane 1 | 863 | 6.9 | 863 | 6.9 | 1037 | 0.832 | 100 | 32.6 | LOS C | 35.4 | 262.7 | Full | 636 | 0.0 | 0.0 |
| Lane 2 | 779 | 7.0 | 779 | 7.0 | 936[1] | 0.832 | 100 | 30.4 | LOS C | 30.0 | 223.0 | Full | 636 | 0.0 | 0.0 |
| Lane 3 | 113 | 8.9 | 113 | 8.9 | 553 | 0.205 | 23[6] | 28.4 | LOS C | 2.5 | 18.9 | Short | 150 | 0.0 | NA |
| Lane 4 | 494 | 8.9 | 494 | 8.9 | 553 | 0.893 | 100 | 48.2 | LOS D | 17.4 | 130.7 | Short | 103 | 0.0 | NA |
| Approach | 2249 | 7.5 | 2249 | 7.5 | | 0.893 | | 35.1 | LOS D | 35.4 | 262.7 | | | | |
| North: Gossamer Drive | | | | | | | | | | | | | | | |
| Lane 1 | 475 | 17.3 | 475 | 17.3 | 911[1] | 0.522 | 100 | 18.4 | LOS B | 11.3 | 91.1 | Short | 30 | 0.0 | NA |
| Lane 2 | 41 | 4.9 | 41 | 4.9 | 241 | 0.170 | 100 | 74.3 | LOS E | 1.9 | 13.6 | Full | 1010 | 0.0 | 0.0 |
| Approach | 516 | 16.3 | 516 | 16.3 | | 0.522 | | 22.8 | LOS C | 11.3 | 91.1 | | | | |
| West: Ti Rakau Drive (West) | | | | | | | | | | | | | | | |
| Lane 1 | 587 | 5.2 | 563 | 5.2 | 629 | 0.895 | 100 | 73.2 | LOS E | 29.7 | 217.3 | Full | 479 | 0.0 | 0.0 |
| Lane 2 | 554 | 5.5 | 532 | 5.5 | 594[1] | 0.895 | 100 | 68.8 | LOS E | 28.3 | 207.4 | Full | 479 | 0.0 | 0.0 |
| Lane 3 | 18 | 0.0 | 17 | 0.0 | 231 | 0.075 | 100 | 75.1 | LOS E | 0.8 | 5.4 | Short | 27 | 0.0 | NA |
| Approach | 1159 | 5.3 | 1112[N1] | 5.3 | | 0.895 | | 71.2 | LOS E | 29.7 | 217.3 | | | | |
| Intersection | 3963 | 7.9 | 3916[N1] | 8.0 | | 0.895 | | 44.3 | LOS D | 35.4 | 262.7 | | | | |

Lane Use and Performance

| | DEMAND FLOWS [ Total | HV ] | ARRIVAL FLOWS [ Total | HV ] | Cap. | Deg. Satn | Lane Util. | Aver. Delay | Level of Service | AVERAGE BACK OF QUEUE [ Veh | Dist ] | Lane Config | Lane Length | Cap. Adj. | Prob. Block. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | veh/h | % | veh/h | % | veh/h | v/c | % | sec | | | m | | m | % | % |
| South: Fremantle Place | | | | | | | | | | | | | | | |
| Lane 1 | 10 | 0.0 | 10 | 0.0 | 65 | 0.155 | 100 | 94.9 | LOS F | 0.5 | 3.6 | Short | 26 | 0.0 | NA |
| Lane 2 | 27 | 3.7 | 27 | 3.7 | 65 | 0.416 | 100 | 95.2 | LOS F | 1.4 | 10.4 | Full | 285 | 0.0 | 0.0 |
| Approach | 37 | 2.7 | 37 | 2.7 | | 0.416 | | 95.1 | LOS F | 1.4 | 10.4 | | | | |
| East: Ti Rakau Drive (East) | | | | | | | | | | | | | | | |
| Lane 1 | 888 | 6.9 | 888 | 6.9 | 1032 | 0.860 | 100 | 33.7 | LOS C | 37.5 | 277.7 | Full | 636 | 0.0 | 0.0 |
| Lane 2 | 806 | 7.0 | 806 | 7.0 | 937[1] | 0.860 | 100 | 32.3 | LOS C | 32.3 | 239.9 | Full | 636 | 0.0 | 0.0 |
| Lane 3 | 110 | 8.5 | 110 | 8.5 | 548 | 0.201 | 23[6] | 28.5 | LOS C | 2.4 | 18.2 | Short | 150 | 0.0 | NA |
| Lane 4 | 480 | 8.5 | 480 | 8.5 | 548 | 0.876 | 100 | 45.3 | LOS D | 16.1 | 121.1 | Short | 103 | 0.0 | NA |
| Approach | 2284 | 7.4 | 2284 | 7.4 | | 0.876 | | 35.4 | LOS D | 37.5 | 277.7 | | | | |
| North: Gossamer Drive | | | | | | | | | | | | | | | |
| Lane 1 | 455 | 16.0 | 455 | 16.0 | 909[1] | 0.501 | 100 | 17.2 | LOS B | 10.3 | 81.8 | Short | 30 | 0.0 | NA |
| Lane 2 | 51 | 5.9 | 51 | 5.9 | 240 | 0.212 | 100 | 74.6 | LOS E | 2.3 | 17.1 | Full | 1010 | 0.0 | 0.0 |
| Approach | 506 | 15.0 | 506 | 15.0 | | 0.501 | | 23.0 | LOS C | 10.3 | 81.8 | | | | |
| West: Ti Rakau Drive (West) | | | | | | | | | | | | | | | |
| Lane 1 | 603 | 4.9 | 560 | 4.8 | 639 | 0.876 | 100 | 66.0 | LOS E | 28.0 | 203.8 | Full | 479 | 0.0 | 0.0 |
| Lane 2 | 564 | 5.8 | 523 | 5.7 | 597[1] | 0.876 | 100 | 64.7 | LOS E | 26.8 | 196.6 | Full | 479 | 0.0 | 0.0 |
| Lane 3 | 18 | 0.0 | 17 | 0.0 | 233 | 0.072 | 100 | 74.5 | LOS E | 0.7 | 5.2 | Short | 27 | 0.0 | NA |
| Approach | 1185 | 5.2 | 1100[N1] | 5.2 | | 0.876 | | 65.5 | LOS E | 28.0 | 203.8 | | | | |
| Intersection | 4012 | 7.7 | 3927[N1] | 7.8 | | 0.876 | | 42.8 | LOS D | 37.5 | 277.7 | | | | |

### 3.5.3 Mitigation 1

- Mitigation 1, to remedy the Ti Rakau Drive / Gossamer Drive intersection during the AM peak, includes the following on the northern Gossamer Drive approach (see figure below):
  - Adding an additional short right-turn lane (100 m).
  - Converting the short left-turn slip lane to pass through the intersection and providing 150 m stacking space.
  - The kerbside short exit lane length is increased from 24 m to 100 m.

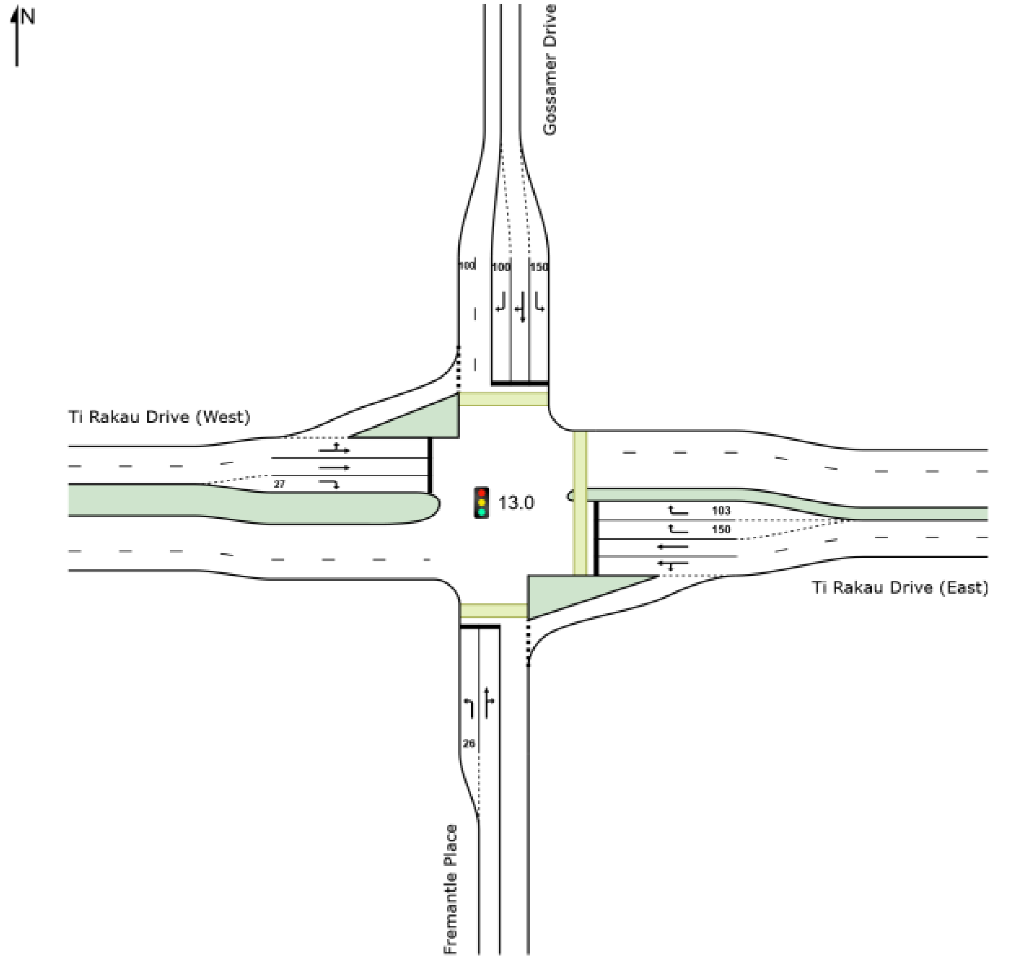



**Figure 5: Ti Rakau Drive / Gossamer Drive – Mitigation 1 proposed layout**

- The Stage 2 intersection performance (without mitigation) is expected to be poor (LOS F), especially in the Gossamer Drive right-turn lane into Ti Rakau Drive where delay increases from around 59 sec in the Do-Min scenario, to 320 sec (5.3 min).
- With the measures in place proposed under Mitigation 1, intersection performance during the detour is expected to be slightly improved, however still LOS F, with an average delay of 117 sec.
- Delay and queue lengths in the Gossamer Drive right-turn lanes are improved under Mitigation 1 (delay of 78 sec and average queue length of 46 m), compared to the Stage 2 detour.
- However, the additional control delay now imposed on the Gossamer Drive left-turn (previously a left-turn slip under the Do-Min and Stage 2 scenarios) has resulted in large delays (141 sec) and queues (478 m) in that lane. Traffic demand in this lane is around 960 veh/h.

**Table 13: Ti Rakau Dr / Gossamer Dr – Stage 2 vs Mitigation 1 (AM)**

Lane Use and Performance

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | AVERAGE BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **South: Fremantle Place** | | | | | | | | | | | | | | | |
| Lane 1 | 23 | 8.7 | 23 | 8.7 | 63 | 0.367 | 100 | 94.2 | LOS F | 1.2 | 8.9 | Short | 26 | 0.0 | NA |
| Lane 2 | 28 | 7.1 | 28 | 7.1 | 65 | 0.429 | 100 | 92.7 | LOS F | 1.4 | 10.8 | Full | 285 | 0.0 | 0.0 |
| Approach | 51 | 7.8 | 51 | 7.8 | | 0.429 | | 93.4 | LOS F | 1.4 | 10.8 | | | | |
| **East: Ti Rakau Drive (East)** | | | | | | | | | | | | | | | |
| Lane 1 | 832 | 10.3 | 832 | 10.3 | 680 | 1.224 | 100 | 272.4 | LOS F | 85.1 | 648.8 | Full | 636 | 0.0 | 51.9 |
| Lane 2 | 792 | 10.5 | 792 | 10.5 | 646[1] | 1.224 | 100 | 277.1 | LOS F | 83.4 | 635.9 | Full | 636 | 0.0 | 50.0 |
| Lane 3 | 65 | 7.8 | 65 | 7.8 | 262 | 0.247 | 23[6] | 41.4 | LOS D | 1.8 | 13.7 | Short | 150 | 0.0 | NA |
| Lane 4 | 282 | 7.8 | 282 | 7.8 | 262 | 1.075 | 100 | 137.8 | LOS F | 16.5 | 123.4 | Short | 103 | 0.0 | NA |
| Approach | 1971 | 9.9 | 1971 | 9.9 | | 1.224 | | 247.4 | LOS F | 85.1 | 648.8 | | | | |
| **North: Gossamer Drive** | | | | | | | | | | | | | | | |
| Lane 1 | 960 | 9.0 | 960 | 9.0 | 1066[1] | 0.901 | 100 | 28.7 | LOS C | 30.7 | 231.8 | Short | 30 | 0.0 | NA |
| Lane 2 | 264 | 6.4 | 264 | 6.4 | 212[1] | 1.246 | 100 | 319.1 | LOS F | 29.7 | 219.6 | Full | 1010 | 0.0 | 0.0 |
| Approach | 1224 | 8.4 | 1224 | 8.4 | | 1.246 | | 91.3 | LOS F | 30.7 | 231.8 | | | | |
| **West: Ti Rakau Drive (West)** | | | | | | | | | | | | | | | |
| Lane 1 | 523 | 11.8 | 432 | 11.6 | 451 | 0.958 | 100 | 98.1 | LOS F | 26.1 | 200.6 | Full | 479 | 0.0 | 0.0 |
| Lane 2 | 500 | 11.9 | 413 | 11.7 | 431[1] | 0.958 | 100 | 96.7 | LOS F | 25.1 | 193.1 | Full | 479 | 0.0 | 0.0 |
| Lane 3 | 10 | 10.0 | 8 | 9.6 | 102 | 0.081 | 100 | 85.7 | LOS F | 0.4 | 3.0 | Short | 27 | 0.0 | NA |
| Approach | 1033 | 11.8 | 854[N1] | 11.7 | | 0.958 | | 97.3 | LOS F | 26.1 | 200.6 | | | | |
| Intersection | 4279 | 9.9 | 4100[N1] | 10.4 | | 1.246 | | 167.6 | LOS F | 85.1 | 648.8 | | | | |

Lane Use and Performance

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | AVERAGE BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **South: Fremantle Place** | | | | | | | | | | | | | | | |
| Lane 1 | 23 | 8.7 | 23 | 8.7 | 63 | 0.367 | 100 | 94.2 | LOS F | 1.2 | 8.9 | Short | 26 | 0.0 | NA |
| Lane 2 | 28 | 7.1 | 28 | 7.1 | 65 | 0.429 | 100 | 92.7 | LOS F | 1.4 | 10.8 | Full | 285 | 0.0 | 0.0 |
| Approach | 51 | 7.8 | 51 | 7.8 | | 0.429 | | 93.4 | LOS F | 1.4 | 10.8 | | | | |
| **East: Ti Rakau Drive (East)** | | | | | | | | | | | | | | | |
| Lane 1 | 847 | 10.4 | 847 | 10.4 | 778 | 1.088 | 100 | 158.3 | LOS F | 68.2 | 519.8 | Full | 636 | 0.0 | 31.2 |
| Lane 2 | 777 | 10.5 | 777 | 10.5 | 714[1] | 1.088 | 100 | 163.8 | LOS F | 64.8 | 494.0 | Full | 636 | 0.0 | 26.6 |
| Lane 3 | 126 | 7.8 | 126 | 7.8 | 598 | 0.210 | 57[6] | 26.0 | LOS C | 2.6 | 19.4 | Short | 150 | 0.0 | NA |
| Lane 4 | 221 | 7.8 | 221 | 7.8 | 598 | 0.370 | 100 | 27.5 | LOS C | 4.9 | 36.6 | Short | 103 | 0.0 | NA |
| Approach | 1971 | 9.9 | 1971 | 9.9 | | 1.088 | | 137.3 | LOS F | 68.2 | 519.8 | | | | |
| **North: Gossamer Drive** | | | | | | | | | | | | | | | |
| Lane 1 | 960 | 9.0 | 960 | 9.0 | 884[1] | 1.086 | 100 | 141.0 | LOS F | 63.4 | 478.0 | Short | 150 | 0.0 | NA |
| Lane 2 | 132 | 5.9 | 132 | 5.9 | 235 | 0.562 | 100 | 77.6 | LOS E | 6.2 | 45.6 | Full | 1010 | 0.0 | 0.0 |
| Lane 3 | 131 | 6.3 | 131 | 6.3 | 233 | 0.562 | 100 | 77.9 | LOS E | 6.2 | 45.5 | Short | 100 | 0.0 | NA |
| Approach | 1223 | 8.3 | 1223 | 8.3 | | 1.086 | | 127.4 | LOS F | 63.4 | 478.0 | | | | |
| **West: Ti Rakau Drive (West)** | | | | | | | | | | | | | | | |
| Lane 1 | 522 | 11.8 | 431 | 11.6 | 549 | 0.786 | 100 | 57.6 | LOS E | 19.4 | 149.0 | Full | 479 | 0.0 | 0.0 |
| Lane 2 | 501 | 11.9 | 413 | 11.8 | 526[1] | 0.786 | 100 | 57.3 | LOS E | 18.7 | 144.5 | Full | 479 | 0.0 | 0.0 |
| Lane 3 | 10 | 10.0 | 8 | 9.6 | 429 | 0.019 | 100 | 53.1 | LOS D | 0.3 | 2.3 | Short | 27 | 0.0 | NA |
| Approach | 1033 | 11.8 | 853[N1] | 11.7 | | 0.786 | | 57.4 | LOS E | 19.4 | 149.0 | | | | |
| Intersection | 4278 | 9.9 | 4098[N1] | 10.3 | | 1.088 | | 117.2 | LOS F | 68.2 | 519.8 | | | | |

- Therefore, alternative measures are proposed under Mitigation 2.

### 3.5.4 Mitigation 2

- Mitigation 2, to remedy the Ti Rakau Drive / Gossamer Drive intersection during the AM peak, includes the following on the northern Gossamer Drive approach (see figure below):
  - Adding an additional short lane (100 m) for the shared through and right-turn movements.
  - Converting the centre lane to a full left-turn lane.
  - Converting the short left-turn slip lane to pass through the intersection and adding 150 m stacking space.
  - The kerbside short exit lane length is increased from 24 m to 100 m.

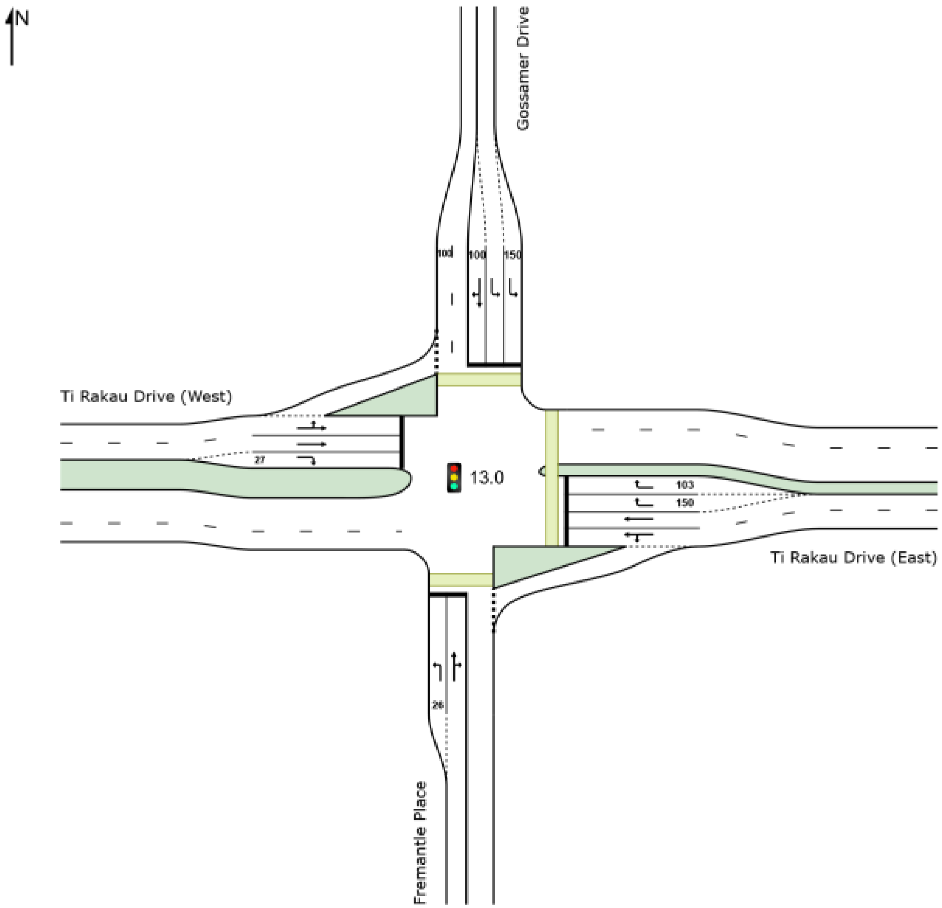



**Figure 6: Ti Rakau Drive / Gossamer Drive – Mitigation 1 proposed layout**

Eastern Busway Alliance

Fletcher | acciona | AECOM | Jacobs

- The Stage 2 intersection performance (without mitigation) is expected to be poor (LOS F), especially in the Gossamer Drive right-turn lane into Ti Rakau Drive where delay increases from around 59 sec in the Do-Min scenario, to 320 sec (5.3 min).
- With the measures in place proposed under Mitigation 2, intersection performance during the detour is expected to be improved to LOS D and with an average delay of 37 sec. This is also an improvement compared to the Do-Min scenario (LOS D and delay of 48 sec).
- Delays and queue lengths in the Gossamer Drive right-turn lane are improved under Mitigation 2 (delay of 75 sec and average queue length of 86 m), compared to the Stage 2 detour.
- The Gossamer Drive left-turn lanes (previously a single left-turn slip under the Stage 2 scenario) are expected to experience improved performance (LOS C), with an average delay of 28 sec and average queue length of 91 m.

**Table 14: Ti Rakau Dr / Gossamer Dr – Stage 2 vs Mitigation 2 (AM)**

Lane Use and Performance

| | DEMAND FLOWS [Total | HV] | ARRIVAL FLOWS [Total | HV] | Cap. | Deg. Satn | Lane Util. | Aver. Delay | Level of Service | AVERAGE BACK OF QUEUE [Veh | Dist] | Lane Config | Lane Length | Cap. Adj. | Prob. Block. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | veh/h | % | veh/h | % | veh/h | v/c | % | sec | | | m | | m | % | % |
| South: Fremantle Place | | | | | | | | | | | | | | | |
| Lane 1 | 23 | 8.7 | 23 | 8.7 | 63 | 0.367 | 100 | 94.2 | LOS F | 1.2 | 8.9 | Short | 26 | 0.0 | NA |
| Lane 2 | 28 | 7.1 | 28 | 7.1 | 65 | 0.429 | 100 | 92.7 | LOS F | 1.4 | 10.8 | Full | 285 | 0.0 | 0.0 |
| Approach | 51 | 7.8 | 51 | 7.8 | | 0.429 | | 93.4 | LOS F | 1.4 | 10.8 | | | | |
| East: Ti Rakau Drive (East) | | | | | | | | | | | | | | | |
| Lane 1 | 832 | 10.3 | 832 | 10.3 | 680 | 1.224 | 100 | 272.4 | LOS F | 85.1 | 648.8 | Full | 636 | 0.0 | 51.9 |
| Lane 2 | 792 | 10.5 | 792 | 10.5 | 646[1] | 1.224 | 100 | 277.1 | LOS F | 83.4 | 635.9 | Full | 636 | 0.0 | 50.0 |
| Lane 3 | 65 | 7.8 | 65 | 7.8 | 262 | 0.247 | 23[6] | 41.4 | LOS D | 1.8 | 13.7 | Short | 150 | 0.0 | NA |
| Lane 4 | 282 | 7.8 | 282 | 7.8 | 262 | 1.075 | 100 | 137.8 | LOS F | 16.5 | 123.4 | Short | 103 | 0.0 | NA |
| Approach | 1971 | 9.9 | 1971 | 9.9 | | 1.224 | | 247.4 | LOS F | 85.1 | 648.8 | | | | |
| North: Gossamer Drive | | | | | | | | | | | | | | | |
| Lane 1 | 960 | 9.0 | 960 | 9.0 | 1066[1] | 0.901 | 100 | 28.7 | LOS C | 30.7 | 231.8 | Short | 30 | 0.0 | NA |
| Lane 2 | 264 | 6.4 | 264 | 6.4 | 212[1] | 1.246 | 100 | 319.1 | LOS F | 29.7 | 219.6 | Full | 1010 | 0.0 | 0.0 |
| Approach | 1224 | 8.4 | 1224 | 8.4 | | 1.246 | | 91.3 | LOS F | 30.7 | 231.8 | | | | |
| West: Ti Rakau Drive (West) | | | | | | | | | | | | | | | |
| Lane 1 | 523 | 11.8 | 432 | 11.6 | 451 | 0.958 | 100 | 98.1 | LOS F | 26.1 | 200.6 | Full | 479 | 0.0 | 0.0 |
| Lane 2 | 500 | 11.9 | 413 | 11.7 | 431[1] | 0.958 | 100 | 96.7 | LOS F | 25.1 | 193.1 | Full | 479 | 0.0 | 0.0 |
| Lane 3 | 10 | 10.0 | 8 | 9.6 | 102 | 0.081 | 100 | 85.7 | LOS F | 0.4 | 3.0 | Short | 27 | 0.0 | NA |
| Approach | 1033 | 11.8 | 854[N1] | 11.7 | | 0.958 | | 97.3 | LOS F | 26.1 | 200.6 | | | | |
| Intersection | 4279 | 9.9 | 4100[N1] | 10.4 | | 1.246 | | 167.6 | LOS F | 85.1 | 648.8 | | | | |

Lane Use and Performance

| | DEMAND FLOWS [Total | HV] | ARRIVAL FLOWS [Total | HV] | Cap. | Deg. Satn | Lane Util. | Aver. Delay | Level of Service | AVERAGE BACK OF QUEUE [Veh | Dist] | Lane Config | Lane Length | Cap. Adj. | Prob. Block. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | veh/h | % | veh/h | % | veh/h | v/c | % | sec | | | m | | m | % | % |
| South: Fremantle Place | | | | | | | | | | | | | | | |
| Lane 1 | 23 | 8.7 | 23 | 8.7 | 79 | 0.289 | 100 | 73.8 | LOS E | 0.9 | 7.0 | Short | 26 | 0.0 | NA |
| Lane 2 | 28 | 7.1 | 28 | 7.1 | 83 | 0.338 | 100 | 72.2 | LOS E | 1.1 | 8.4 | Full | 285 | 0.0 | 0.0 |
| Approach | 51 | 7.8 | 51 | 7.8 | | 0.338 | | 72.9 | LOS E | 1.1 | 8.4 | | | | |
| East: Ti Rakau Drive (East) | | | | | | | | | | | | | | | |
| Lane 1 | 846 | 10.4 | 846 | 10.4 | 960 | 0.881 | 100 | 36.2 | LOS D | 31.8 | 242.5 | Full | 636 | 0.0 | 0.0 |
| Lane 2 | 778 | 10.5 | 778 | 10.5 | 883[1] | 0.881 | 100 | 36.1 | LOS D | 28.5 | 217.7 | Full | 636 | 0.0 | 0.0 |
| Lane 3 | 126 | 7.8 | 126 | 7.8 | 320 | 0.393 | 57[6] | 31.4 | LOS C | 2.5 | 18.8 | Short | 150 | 0.0 | NA |
| Lane 4 | 221 | 7.8 | 221 | 7.8 | 320 | 0.692 | 100 | 33.9 | LOS C | 4.8 | 36.0 | Short | 103 | 0.0 | NA |
| Approach | 1971 | 9.9 | 1971 | 9.9 | | 0.881 | | 35.6 | LOS D | 31.8 | 242.5 | | | | |
| North: Gossamer Drive | | | | | | | | | | | | | | | |
| Lane 1 | 480 | 9.0 | 480 | 9.0 | 687 | 0.698 | 100 | 27.4 | LOS C | 12.0 | 90.2 | Short | 150 | 0.0 | NA |
| Lane 2 | 480 | 9.0 | 480 | 9.0 | 687 | 0.698 | 100 | 27.4 | LOS C | 12.0 | 90.2 | Full | 1010 | 0.0 | 0.0 |
| Lane 3 | 264 | 6.4 | 264 | 6.4 | 296 | 0.891 | 100 | 74.7 | LOS E | 11.6 | 85.9 | Short | 100 | 0.0 | NA |
| Approach | 1224 | 8.4 | 1224 | 8.4 | | 0.891 | | 37.6 | LOS D | 12.0 | 90.2 | | | | |
| West: Ti Rakau Drive (West) | | | | | | | | | | | | | | | |
| Lane 1 | 523 | 11.8 | 431 | 11.6 | 669 | 0.645 | 100 | 37.1 | LOS D | 13.6 | 104.3 | Full | 479 | 0.0 | 0.0 |
| Lane 2 | 500 | 11.9 | 413 | 11.8 | 640[1] | 0.645 | 100 | 36.2 | LOS D | 13.1 | 101.3 | Full | 479 | 0.0 | 0.0 |
| Lane 3 | 10 | 10.0 | 8 | 9.6 | 117 | 0.071 | 100 | 67.7 | LOS E | 0.3 | 2.3 | Short | 27 | 0.0 | NA |
| Approach | 1033 | 11.8 | 852[N1] | 11.7 | | 0.645 | | 37.0 | LOS D | 13.6 | 104.3 | | | | |
| Intersection | 4279 | 9.9 | 4098[N1] | 10.4 | | 0.891 | | 36.9 | LOS D | 31.8 | 242.5 | | | | |

- <u>Mitigation 2 is expected to result in improved performance compared to Mitigation 1 and it is recommended that this mitigation measure be discussed with key stakeholders.</u>

## 4.0 Traffic Volumes in the wider Project Area

- **Table 15** below shows an increase in demand in the Gossamer Drive left-turn at the intersection with Pakuranga Road, and in the Gossamer Drive right-turn lane at Ti Rakau Drive during the AM and PM.
- The table below also shows an increase in the Ti Rakau Drive west approach left-turn lane into Gossamer Drive during the PM.
- Overall, it seems that only a small percentage of traffic is routing along the proposed detour route (probably due to the already congested nature of those intersections).
- As a result, in the **inbound** (citybound) direction during the AM demand seems to detour via Gossamer Road to Pakuranga Road in the north and Ti Rakau Drive in the south.
- In the PM in the **outbound** direction, demand seems to return via Pakuranga Road, and via SEART turning right onto Ti Rakau Drive.

**Table 15: Gossamer Road traffic volumes**

| | | | DM AM peak 0645-0745 | | | | Stage 2 AM peak 0800-0900 | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Traffic Flow (Vehicles / hr) | | | | Traffic Flow (Vehicles / hr) | | | |
| | | | Car | Truck | Bus | **Total** | Car | Truck | Bus | **Total** |
| **Pakuranga Road / Gossamer Drive** | Pakuranga Road (West) | Through | 503 | 28 | 6 | **536** | 613 | 40 | 6 | **659** |
| | | Right | 143 | 13 | 0 | **156** | 139 | 19 | 0 | **158** |
| | Pakuranga Road (East) | Left | 847 | 20 | 3 | **871** | 839 | 32 | 3 | **874** |
| | | Through Bus-lane | 0 | 0 | 12 | **12** | 0 | 0 | 10 | **10** |
| | | Through | 1632 | 83 | 0 | **1715** | 1033 | 50 | 0 | **1082** |
| | Gossamer Drive | Left | 59 | 5 | 0 | **63** | 100 | 7 | 0 | **107** |
| | | Right | 273 | 10 | 2 | **285** | 253 | 13 | 2 | **268** |
| | Total (Maximum in Red) | | 3457 | 159 | 23 | **3639** | 2975 | 162 | 21 | **3158** |
| **Ti Rakau Drive / Gossamer Drive / Fremantle Place** | Ti Rakau Drive (North) | Left | 18 | 1 | 0 | **19** | 34 | 4 | 0 | **37** |
| | | Through | 733 | 71 | 14 | **817** | 868 | 104 | 13 | **985** |
| | | Right | 9 | 1 | 0 | **10** | 9 | 1 | 0 | **10** |
| | Gossamer Drive | Left | 974 | 79 | 0 | **1053** | 874 | 86 | 0 | **960** |
| | | Through | 9 | 1 | 0 | **10** | 9 | 1 | 0 | **10** |
| | | Right | 83 | 7 | 0 | **90** | 238 | 16 | 0 | **255** |
| | Ti Rakau Drive (South) | Left | 13 | 1 | 0 | **14** | 18 | 1 | 0 | **18** |
| | | Through | 1490 | 173 | 16 | **1679** | 1437 | 152 | 16 | **1605** |
| | | Right | 229 | 21 | 0 | **250** | 320 | 27 | 0 | **347** |
| | Fremantle Place | Left | 24 | 1 | 0 | **25** | 21 | 2 | 0 | **23** |
| | | Through | 13 | 0 | 0 | **13** | 10 | 0 | 0 | **10** |
| | | Right | 17 | 1 | 0 | **18** | 16 | 2 | 0 | **18** |
| | Total (Maximum in Red) | | 3602 | 357 | 29 | **3988** | 3842 | 396 | 29 | **4267** |

| | | | DM PM peak 1615-1715 | | | | Stage 2 PM peak 1615-1715 | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Traffic Flow (Vehicles / hr) | | | | Traffic Flow (Vehicles / hr) | | | |
| | | | Car | Truck | Bus | **Total** | Car | Truck | Bus | **Total** |
| **Pakuranga Road / Gossamer Drive** | Pakuranga Road (West) | Through | 1920 | 84 | 14 | **2017** | 1795 | 79 | 14 | **1887** |
| | | Right | 44 | 2 | 0 | **46** | 47 | 5 | 0 | **51** |
| | Pakuranga Road (East) | Left | 248 | 7 | 2 | **257** | 232 | 7 | 2 | **241** |
| | | Through Bus-lane | 0 | 0 | 6 | **6** | 0 | 0 | 6 | **6** |
| | | Through | 1104 | 45 | 0 | **1149** | 1107 | 45 | 0 | **1152** |
| | Gossamer Drive | Left | 4 | 6 | 0 | **10** | 4 | 6 | 0 | **10** |
| | | Right | 593 | 14 | 4 | **611** | 595 | 14 | 4 | **614** |
| | Total (Maximum in Red) | | 3911 | 158 | 26 | **4095** | 3770 | 155 | 26 | **3960** |
| **Ti Rakau Drive / Gossamer Drive / Fremantle Place** | Ti Rakau Drive (North) | Left | 59 | 2 | 0 | **61** | 126 | 2 | 0 | **128** |
| | | Through | 1021 | 42 | 17 | **1079** | 979 | 43 | 17 | **1039** |
| | | Right | 18 | 0 | 0 | **19** | 18 | 0 | 0 | **19** |
| | Gossamer Drive | Left | 393 | 82 | 0 | **475** | 382 | 73 | 0 | **456** |
| | | Through | 9 | 1 | 0 | **10** | 8 | 2 | 0 | **10** |
| | | Right | 30 | 1 | 0 | **31** | 40 | 1 | 0 | **41** |
| | Ti Rakau Drive (South) | Left | 20 | 0 | 0 | **20** | 20 | 0 | 0 | **21** |
| | | Through | 1508 | 101 | 13 | **1622** | 1556 | 105 | 13 | **1674** |
| | | Right | 553 | 54 | 0 | **606** | 540 | 50 | 0 | **590** |
| | Fremantle Place | Left | 12 | 0 | 0 | **12** | 10 | 0 | 0 | **10** |
| | | Through | 10 | 0 | 0 | **10** | 10 | 0 | 0 | **10** |
| | | Right | 16 | 1 | 0 | **18** | 16 | 1 | 0 | **18** |
| | Total (Maximum in Red) | | 3640 | 285 | 30 | **3956** | 3700 | 278 | 30 | **4008** |

## 5.0 Impacts to Buses

- The impacts to buses through the project area are expected to be low as the frequency of the 711 route in the AM inbound direction is only 4 buses/h (1 every 15min).
- As shown above, the William Roberts Road / Reeves Road intersection is expected to operate with good LOS in the AM.
- The William Roberts Road / Pakuranga Road intersection is already saturated in the Do-Min AM scenario and the impact of the detour is expected to be negligible.
- The Pakuranga Road / Ti Rakau Drive intersection is expected to operate at LOS D during the AM.

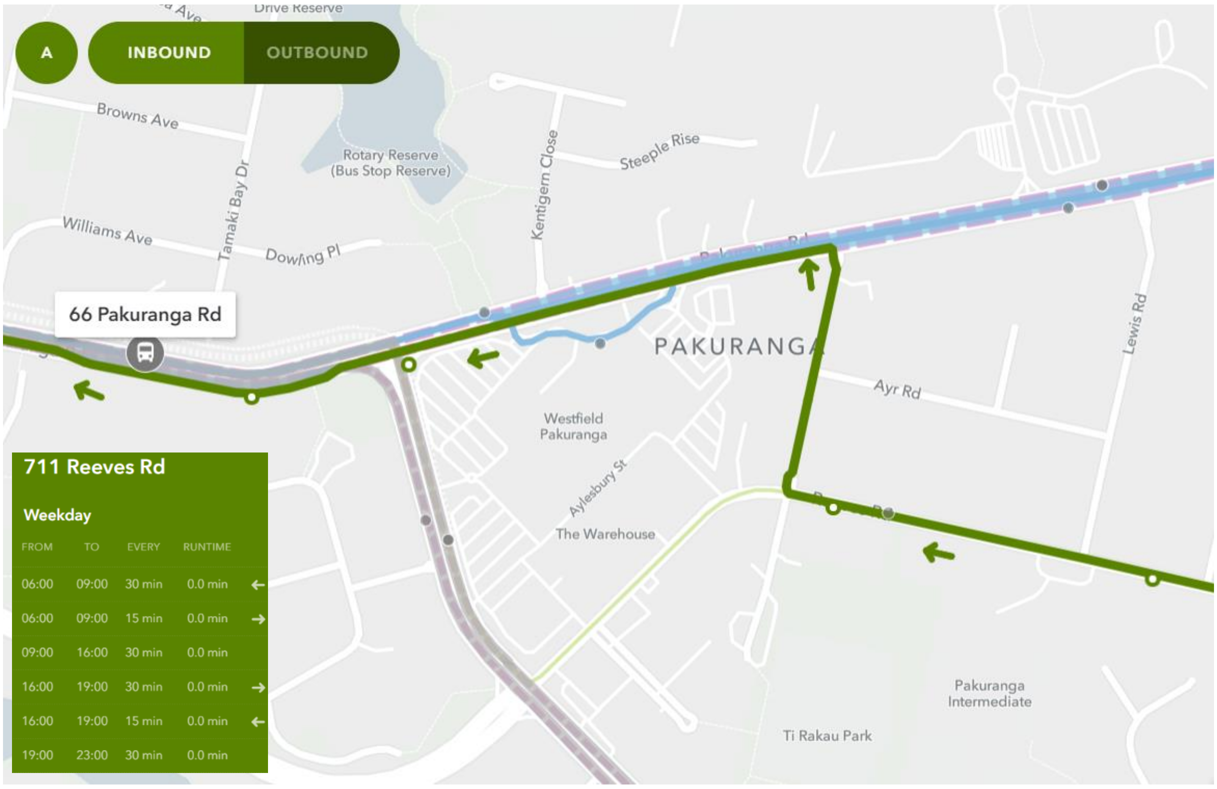



**Figure 7: Inbound buses through project area**

- NOTE: The 711 outbound route below is based on the Do-Min scenario. During Stage 2, with Reeves Road closed between Ti Rakau Drive and William Roberts Road, it is anticipated buses will continue along Ti Rakau Drive and turn left at the newly completed Ti Rakau Drive / William Roberts Road intersection.
- The impacts to buses through the project area are expected to be low as the frequency of the 711 route in the PM outbound direction is only 4 buses/h (1 every 15min).
- The Pakuranga Road / Ti Rakau Drive intersection is expected to perform at LOS F during the Stage 2 PM scenario, compared to the LOS E of the Do-Min scenario, however, the Pakuranga Road west approach is already at capacity (including the bus lanes).
    - However, performance is expected to improve at this intersection with the mitigation measures proposed under **Section 3.4**.
- The Ti Rakau Drive / SEART intersection is already saturated during the PM peak and the impact of the detour is expected to be negligible.
    - However, performance is expected to improve at this intersection with the mitigation measures proposed under **Section 3.4**.
- It is expected that the Ti Rakau Drive / William Roberts Road LILO intersection would operate with acceptable LOS and the impact of the detour would be negligible at this intersection.

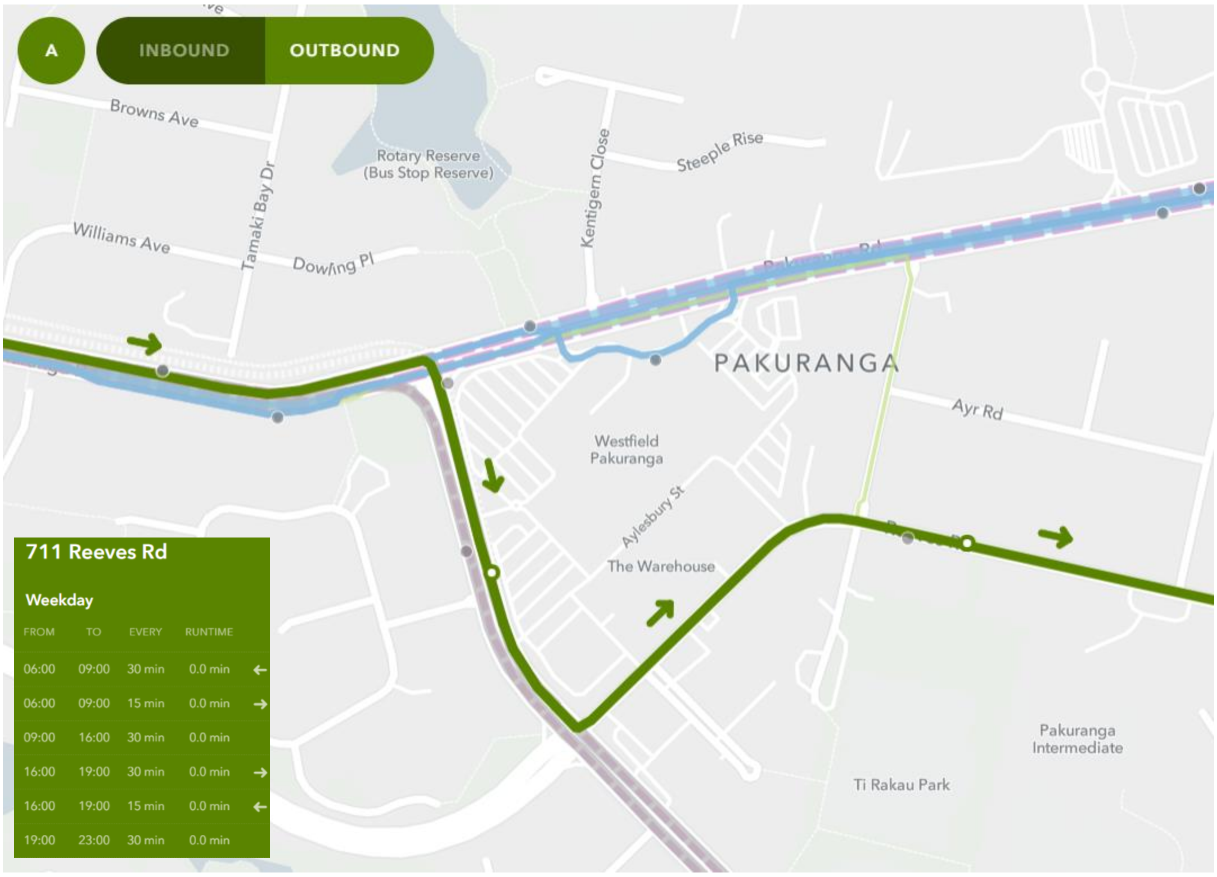
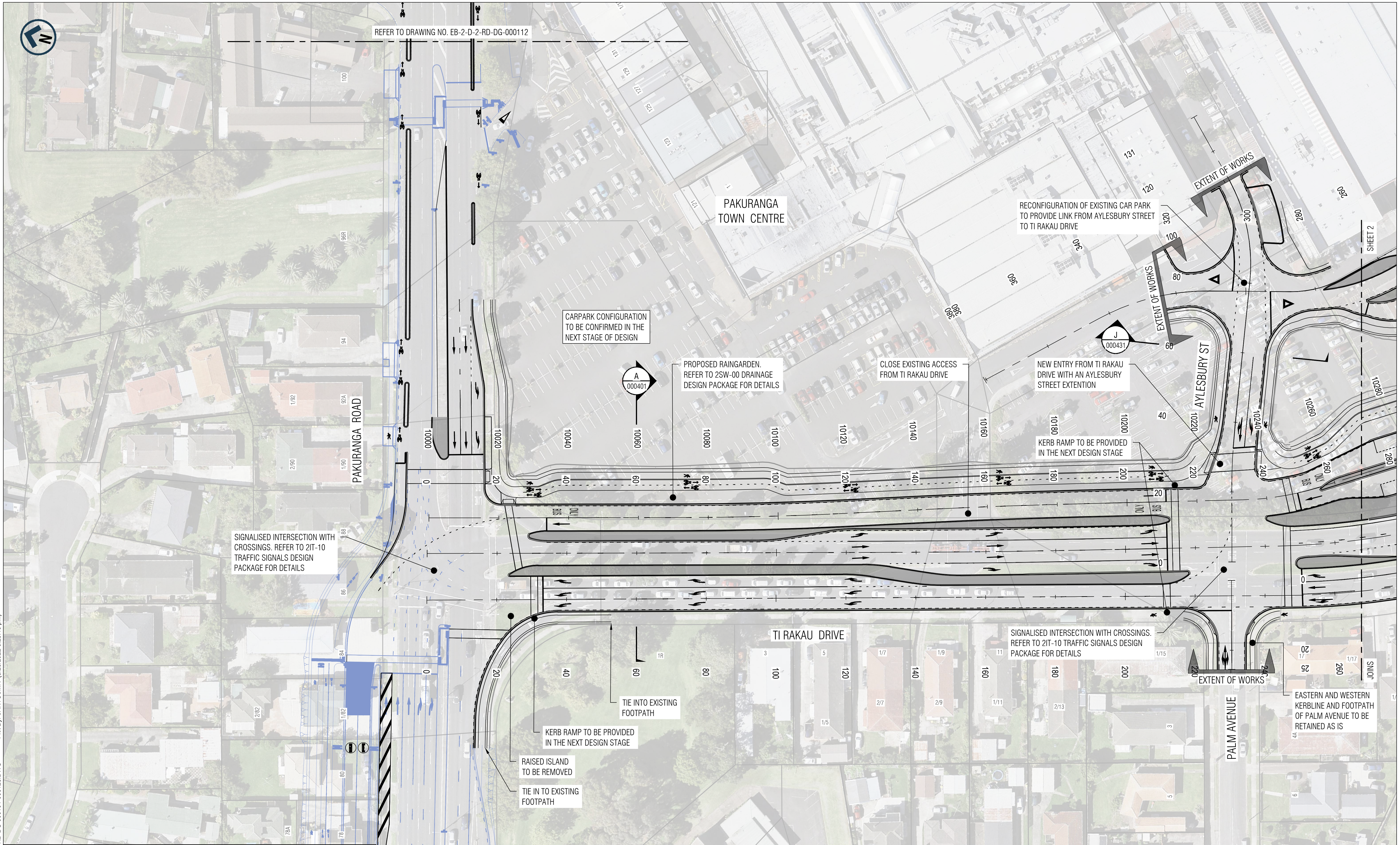



**Figure 8: Outbound buses through project area**

# Appendix B

**EB2 General Arrangement Plans**




## NOTES

1. DO NOT SCALE OFF THESE DRAWINGS.
2. ALL DIMENSIONS AND DISTANCES ARE IN METRES UNLESS STATED OTHERWISE.
3. REFER TO DRAWINGS EB-2-D-2-RD-DG-000004 FOR LEGEND AND EB-2-D-2-RD-DG-000005 FOR GENERAL NOTES.

Filename: EB-2-D-2-RD-DG-000101-000125.DWG    Plot By: SANTOSMR (3/29/2022 6:23:45 pm)

| REV | DATE | DRAWN | REVISION DESCRIPTION |
|---|---|---|---|
| A | 29/03/2022 | M. Santos | ISSUED FOR STAGE 1 SUBMISSION |

This drawing is confidential and shall only be used for the purpose of this project. The signing of this title block confirms the design and drafting of this project have been prepared and checked in accordance with the Alliance quality assurance system to ISO 9001. Printed copies of this document are UNCONTROLLED. Do not scale from this drawing

| | | | |
|---|---|---|---|
| Designed | D. deAbrew | Checked | D. Angus |
| Drawn | M. Santos | Checked | M. Dalvi |
| Approved | S. Jones | | |
| Date | 29/03/2022 | Approver Signature | |

Scale Bar: 0 12.5 25 m — A1 1:500, A3 1:1000

KEY PLAN

AUCKLAND MANUKAU EASTERN TRANSPORT INITIATIVE
EASTERN BUSWAY ALLIANCE
(PAKURANGA TO BOTANY)

Eastern Busway

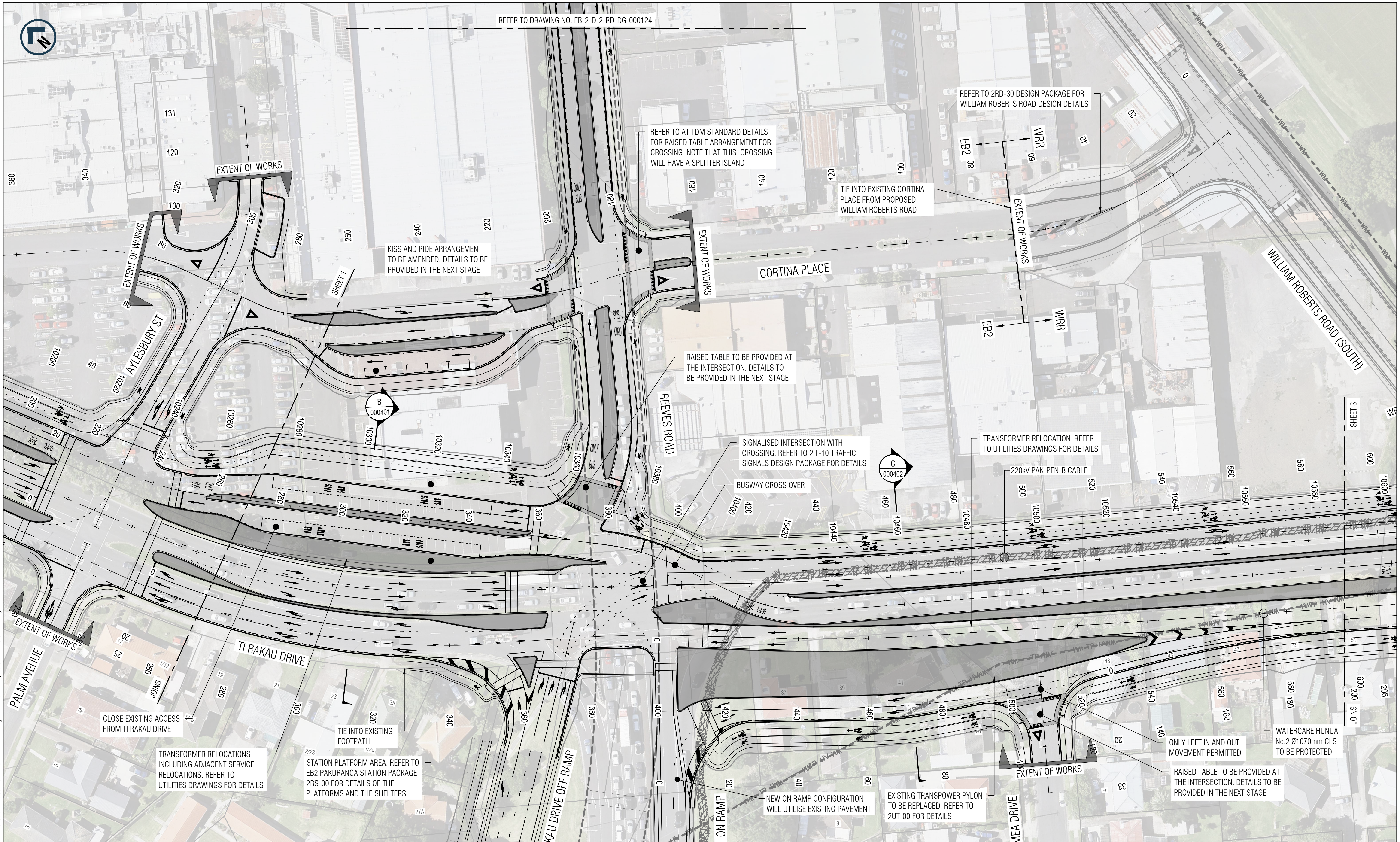
Drawing Status: STAGE 1
Horizontal Datum: NZGD 2000 MOUNT EDEN CIRCUIT
Vertical Datum: 2016 NEW ZEALAND
A1 SCALE 1:500 | A3 SCALE 1:1000

Design Package: ROADWORK GEOMETRIC DESIGN

Drawing Title: TI RAKAU DRIVE GENERAL ARRANGEMENT PLAN SHEET 1 OF 3

Drawing Number: EB-2-D-2-RD-DG-000101    Revision: A

ORIGINAL SIZE A1    ORIGINAL IN COLOUR




## NOTES

1. DO NOT SCALE OFF THESE DRAWINGS.
2. ALL DIMENSIONS AND DISTANCES ARE IN METRES UNLESS STATED OTHERWISE.
3. REFER TO DRAWINGS EB-2-D-2-RD-DG-000004 FOR LEGEND AND EB-2-D-2-RD-DG-000005 FOR GENERAL NOTES.

PACKAGE No. 2RD-00

NOT FOR CONSTRUCTION

Filename: EB-2-D-2-RD-DG-000101-000125.DWG

Plot By: SANTOSMR (3/31/2022 10:02:44 am)

| REV | DATE | DRAWN | REVISION DESCRIPTION |
|---|---|---|---|
| A | 29/03/2022 | M. Santos | ISSUED FOR STAGE 1 SUBMISSION |



| | | | |
|---|---|---|---|
| Designed | D. deAbrew | Checked | D. Angus |
| Drawn | M. Santos | Checked | M. Dalvi |
| Approved | S. Jones | | |
| Date | 29/03/2022 | Approver Signature | |

Scale Bar: 0 12.5 25 m — A1 1:500 A3 1:1000

KEY PLAN

AUCKLAND MANUKAU EASTERN TRANSPORT INITIATIVE
EASTERN BUSWAY ALLIANCE
(PAKURANGA TO BOTANY)

Eastern Busway

Drawing Status: STAGE 1
Horizontal Datum: NZGD 2000 MOUNT EDEN CIRCUIT
Vertical Datum: 2016 NEW ZEALAND
A1 SCALE 1:500 A3 SCALE 1:1000

Design Package: ROADWORK GEOMETRIC DESIGN

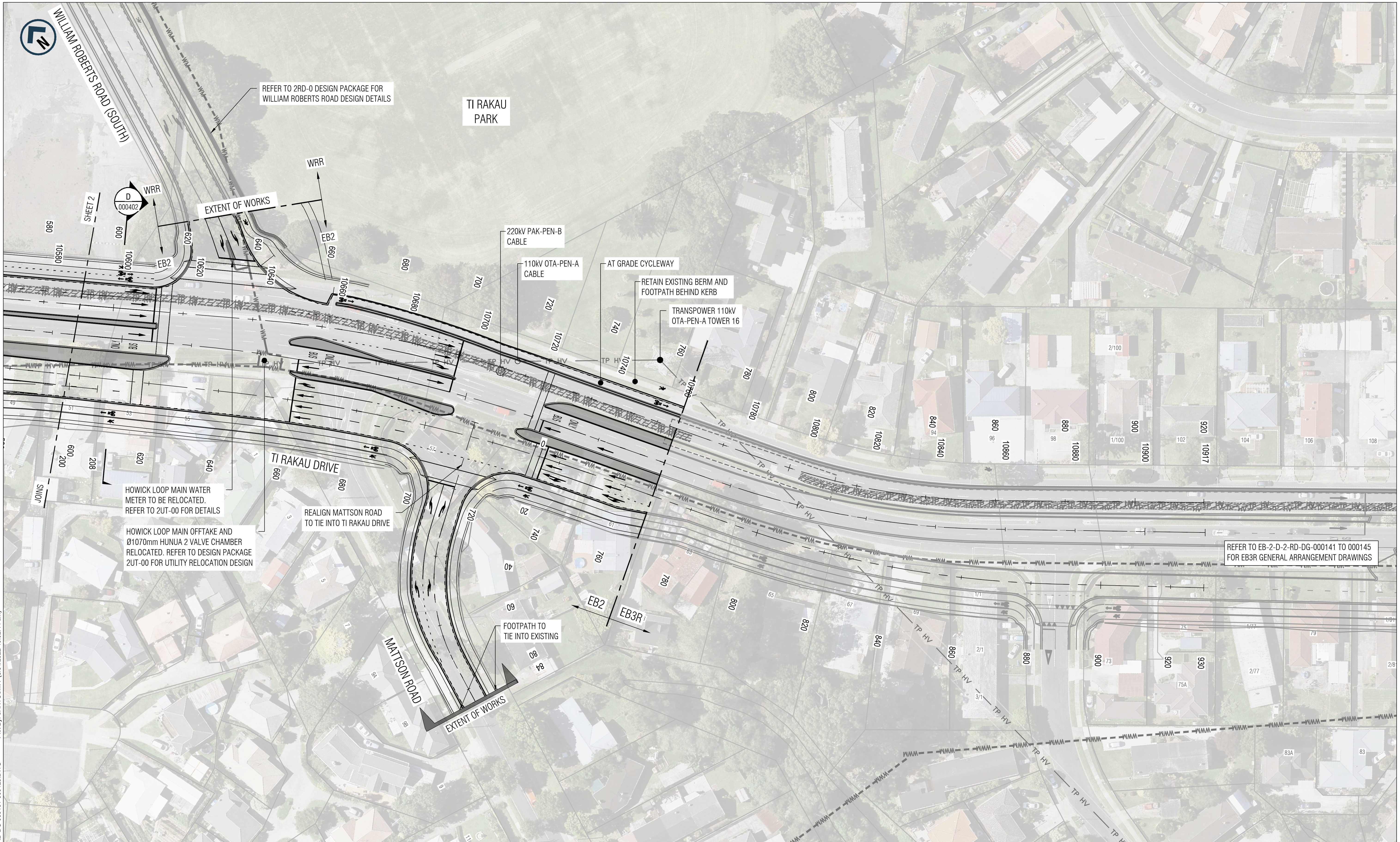
Drawing Title: TI RAKAU DRIVE GENERAL ARRANGEMENT PLAN SHEET 2 OF 3

Drawing Number: EB-2-D-2-RD-DG-000102

Revision: A

ORIGINAL SIZE A1

ORIGINAL IN COLOUR




NOTES
1. DO NOT SCALE OFF THESE DRAWINGS.
2. ALL DIMENSIONS AND DISTANCES ARE IN METRES UNLESS STATED OTHERWISE.
3. REFER TO DRAWINGS EB-2-D-2-RD-DG-000004 FOR LEGEND AND EB-2-D-2-RD-DG-000005 FOR GENERAL NOTES.

PACKAGE No. 2RD-00

NOT FOR CONSTRUCTION

| REV | DATE | DRAWN | REVISION DESCRIPTION |
|---|---|---|---|
| A | 29/03/2022 | M. Santos | ISSUED FOR STAGE 1 SUBMISSION |

This drawing is confidential and shall only be used for the purpose of this project. The signing of this title block confirms the design and drafting of this project have been prepared and checked in accordance with the Alliance quality assurance system to ISO 9001. Printed copies of this document are UNCONTROLLED. Do not scale from this drawing

| | | | |
|---|---|---|---|
| Designed | D. deAbrew | Checked | D. Angus |
| Drawn | M. Santos | Checked | M. Dalvi |
| Approved | S. Jones | | |
| Date | 29/03/2022 | | Approver Signature |

Scale Bar 0 12.5 25 m A1 1:500 A3 1:1000

KEY PLAN

AUCKLAND MANUKAU EASTERN TRANSPORT INITIATIVE
EASTERN BUSWAY ALLIANCE
(PAKURANGA TO BOTANY)

Eastern Busway

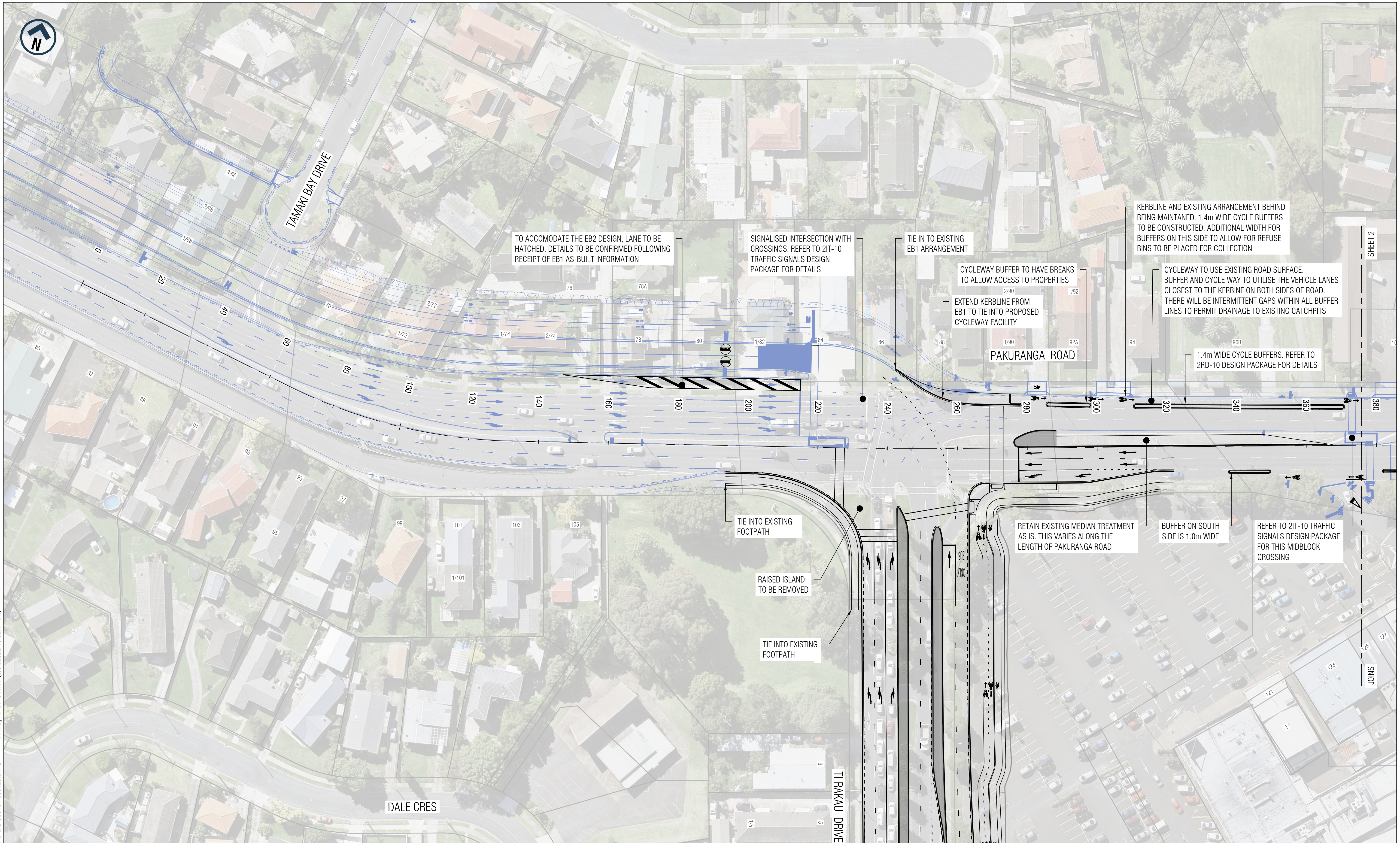
Drawing Status: STAGE 1
Horizontal Datum: NZGD 2000 MOUNT EDEN CIRCUIT
Vertical Datum: 2016 NEW ZEALAND
A1 SCALE 1:500 A3 SCALE 1:1000

Design Package: ROADWORK GEOMETRIC DESIGN
Drawing Title: TI RAKAU DRIVE GENERAL ARRANGEMENT PLAN SHEET 3 OF 3
Drawing Number: EB-2-D-2-RD-DG-000103
Revision: A

Filename: EB-2-D-2-RD-DG-000101-000125.DWG Plot By: SANTOSMR (3/31/2022 10:02:44 am)

ORIGINAL SIZE A1

ORIGINAL IN COLOUR




PACKAGE No. 2RD-00

NOT FOR CONSTRUCTION

## NOTES

1. DO NOT SCALE OFF THESE DRAWINGS.
2. ALL DIMENSIONS AND DISTANCES ARE IN METRES UNLESS STATED OTHERWISE.
3. REFER TO DRAWINGS EB-2-D-2-RD-DG-000004 FOR LEGEND AND EB-2-D-2-RD-DG-000005 FOR GENERAL NOTES.

Filename: EB-2-D-2-RD-DG-000101-000125.DWG Plot By: SANTOSMR (3/31/2022 10:02:44 am)

| REV | DATE | DRAWN | REVISION DESCRIPTION |
|---|---|---|---|
| A | 29/03/2022 | M. Santos | ISSUED FOR STAGE 1 SUBMISSION |

ORIGINAL SIZE A1

ORIGINAL IN COLOUR

This drawing is confidential and shall only be used for the purpose of this project. The signing of this title block confirms the design and drafting of this project have been prepared and checked in accordance with the Alliance quality assurance system to ISO 9001. Printed copies of this document are UNCONTROLLED. Do not scale from this drawing

| | | | |
|---|---|---|---|
| Designed | D. deAbrew | Checked | D. Angus |
| Drawn | M. Santos | Checked | M. Dalvi |
| Approved | S. Jones | | |
| Date | 29/03/2022 | | Approver Signature |

Scale Bar 0 12.5 25 m A1 1:500 A3 1:1000

KEY PLAN

AUCKLAND MANUKAU EASTERN TRANSPORT INITIATIVE
EASTERN BUSWAY ALLIANCE
(PAKURANGA TO BOTANY)

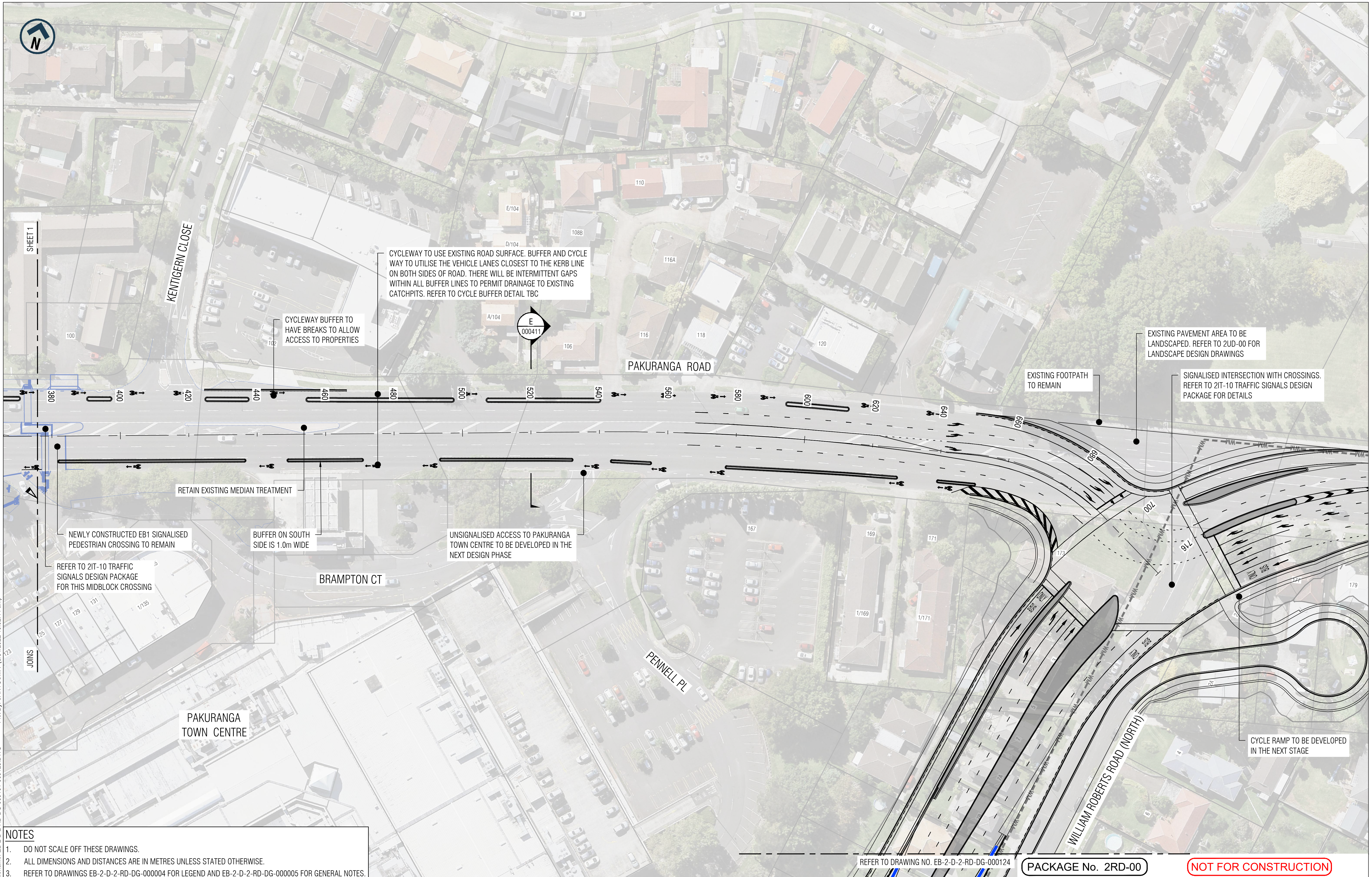
Eastern Busway

Drawing Status: STAGE 1
Horizontal Datum: NZGD 2000 MOUNT EDEN CIRCUIT
Vertical Datum: 2016 NEW ZEALAND
A1 SCALE 1:500 A3 SCALE 1:1000

Design Package: ROADWORK GEOMETRIC DESIGN

Drawing Title: PAKURANGA ROAD GENERAL ARRANGEMENT PLAN SHEET 1 OF 2

Drawing Number: EB-2-D-2-RD-DG-000111 Revision: A




Filename: EB-2-D-2-RD-DG-000101-000125.DWG Plot By: SANTOSMR (3/31/2022 10:02:44 am)

## NOTES

1. DO NOT SCALE OFF THESE DRAWINGS.
2. ALL DIMENSIONS AND DISTANCES ARE IN METRES UNLESS STATED OTHERWISE.
3. REFER TO DRAWINGS EB-2-D-2-RD-DG-000004 FOR LEGEND AND EB-2-D-2-RD-DG-000005 FOR GENERAL NOTES.

PACKAGE No. 2RD-00

NOT FOR CONSTRUCTION

| REV | DATE | DRAWN | REVISION DESCRIPTION |
|---|---|---|---|
| A | 29/03/2022 | M. Santos | ISSUED FOR STAGE 1 SUBMISSION |

A1 ORIGINAL SIZE

ORIGINAL IN COLOUR

This drawing is confidential and shall only be used for the purpose of this project. The signing of this title block confirms the design and drafting of this project have been prepared and checked in accordance with the Alliance quality assurance system to ISO 9001. Printed copies of this document are UNCONTROLLED. Do not scale from this drawing

| | | | |
|---|---|---|---|
| Designed | D. deAbrew | Checked | D. Angus |
| Drawn | M. Santos | Checked | M. Dalvi |
| Approved | S. Jones | | |
| Date | 29/03/2022 | Approver Signature | |

Scale Bar 0 12.5 25 m A1 1:500 A3 1:1000

KEY PLAN

AUCKLAND MANUKAU EASTERN TRANSPORT INITIATIVE
EASTERN BUSWAY ALLIANCE
(PAKURANGA TO BOTANY)

Eastern Busway

| | |
|---|---|
| Drawing Status | STAGE 1 |
| Horizontal Datum | NZGD 2000 MOUNT EDEN CIRCUIT |
| Vertical Datum | 2016 NEW ZEALAND |
| A1 SCALE 1:500 | A3 SCALE 1:1000 |

Design Package: ROADWORK GEOMETRIC DESIGN

Drawing Title: PAKURANGA ROAD GENERAL ARRANGEMENT PLAN SHEET 2 OF 2

Drawing Number: EB-2-D-2-RD-DG-000112

Revision: A


## NOTES

1. DO NOT SCALE OFF THESE DRAWINGS.
2. ALL DIMENSIONS AND DISTANCES ARE IN METRES UNLESS STATED OTHERWISE.
3. REFER TO DRAWINGS EB-2-D-2-RD-DG-000004 FOR LEGEND AND EB-2-D-2-RD-DG-000005 FOR GENERAL NOTES.

PACKAGE No. 2RD-00

NOT FOR CONSTRUCTION

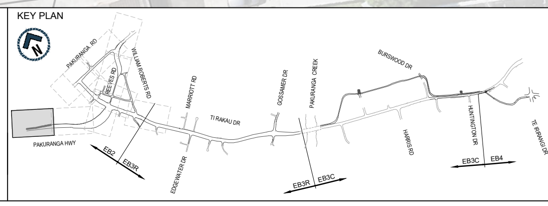
| REV | DATE | DRAWN | REVISION DESCRIPTION |
|---|---|---|---|
| A | 29/03/2022 | M. Santos | ISSUED FOR STAGE 1 SUBMISSION |



| | | | |
|---|---|---|---|
| Designed | D. deAbrew | Checked | D. Angus |
| Drawn | M. Santos | Checked | M. Dalvi |
| Approved | S. Jones | | |
| Date | 29/03/2022 | Approver Signature | |

Scale Bar: 0 — 12.5 — 25 m (A1 1:500, A3 1:1000)

KEY PLAN



AUCKLAND MANUKAU EASTERN TRANSPORT INITIATIVE
EASTERN BUSWAY ALLIANCE
(PAKURANGA TO BOTANY)

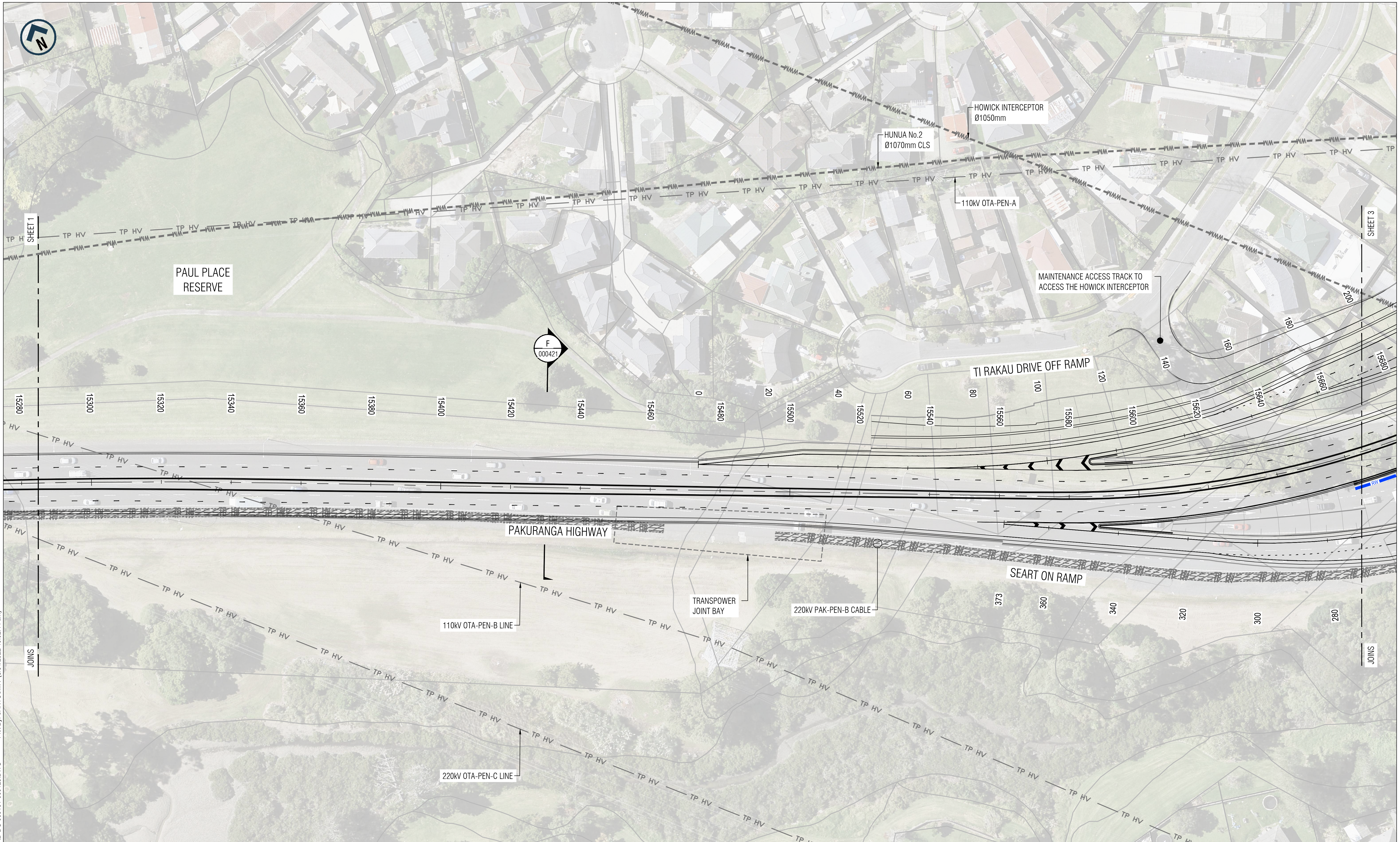
Eastern Busway

| | |
|---|---|
| Drawing Status | STAGE 1 |
| Horizontal Datum | NZGD 2000 MOUNT EDEN CIRCUIT |
| Vertical Datum | 2016 NEW ZEALAND |
| A1 SCALE | 1:500 |
| A3 SCALE | 1:1000 |
| Design Package | ROADWORK GEOMETRIC DESIGN |
| Drawing Title | PAKURANGA HIGHWAY / REEVES ROAD GENERAL ARRANGEMENT PLAN SHEET 1 OF 5 |
| Drawing Number | EB-2-D-2-RD-DG-000121 |
| Revision | A |

ORIGINAL SIZE A1

ORIGINAL IN COLOUR

Filename: EB-2-D-2-RD-DG-000101-000125.DWG Plot By: SANTOSMR (3/31/2022 10:02:44 am)




## NOTES

1. DO NOT SCALE OFF THESE DRAWINGS.
2. ALL DIMENSIONS AND DISTANCES ARE IN METRES UNLESS STATED OTHERWISE.
3. REFER TO DRAWINGS EB-2-D-2-RD-DG-000004 FOR LEGEND AND EB-2-D-2-RD-DG-000005 FOR GENERAL NOTES.

PACKAGE No. 2RD-00

NOT FOR CONSTRUCTION

Filename: EB-2-D-2-RD-DG-000101-000125.DWG Plot By: SANTOSMR (3/31/2022 10:02:44 am)

| REV | DATE | DRAWN | REVISION DESCRIPTION |
|---|---|---|---|
| A | 29/03/2022 | M. Santos | ISSUED FOR STAGE 1 SUBMISSION |

A1 ORIGINAL SIZE

ORIGINAL IN COLOUR

This drawing is confidential and shall only be used for the purpose of this project. The signing of this title block confirms the design and drafting of this project have been prepared and checked in accordance with the Alliance quality assurance system to ISO 9001. Printed copies of this document are UNCONTROLLED. Do not scale from this drawing

| | | | |
|---|---|---|---|
| Designed | D. deAbrew | Checked | D. Angus |
| Drawn | M. Santos | Checked | M. Dalvi |
| Approved | S. Jones | | |
| Date | 29/03/2022 | Approver Signature | |

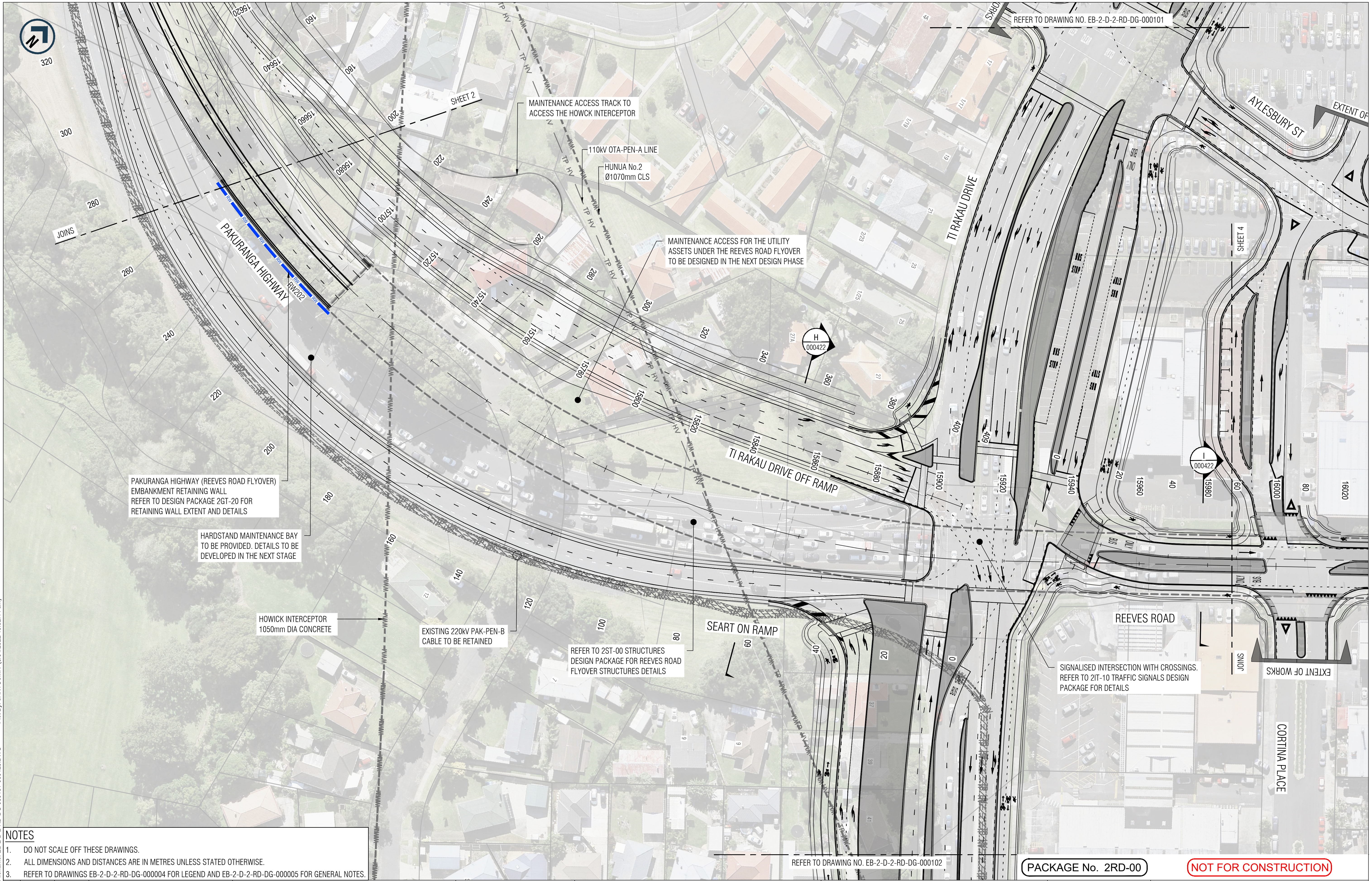
Scale Bar: 0 – 12.5 – 25 m; A1 1:500, A3 1:1000

KEY PLAN

AUCKLAND MANUKAU EASTERN TRANSPORT INITIATIVE
EASTERN BUSWAY ALLIANCE
(PAKURANGA TO BOTANY)

Eastern Busway

| | |
|---|---|
| Drawing Status | STAGE 1 |
| Horizontal Datum | NZGD 2000 MOUNT EDEN CIRCUIT |
| Vertical Datum | 2016 NEW ZEALAND |
| A1 SCALE 1:500 | A3 SCALE 1:1000 |
| Design Package | ROADWORK GEOMETRIC DESIGN |
| Drawing Title | PAKURANGA HIGHWAY / REEVES ROAD GENERAL ARRANGEMENT PLAN SHEET 2 OF 5 |
| Drawing Number | EB-2-D-2-RD-DG-000122 |
| Revision | A |




NOTES

1. DO NOT SCALE OFF THESE DRAWINGS.
2. ALL DIMENSIONS AND DISTANCES ARE IN METRES UNLESS STATED OTHERWISE.
3. REFER TO DRAWINGS EB-2-D-2-RD-DG-000004 FOR LEGEND AND EB-2-D-2-RD-DG-000005 FOR GENERAL NOTES.

Filename: EB-2-D-2-RD-DG-000101-000125.DWG    Plot By: SANTOSMR (3/31/2022 10:02:44 am)

| REV | DATE | DRAWN | REVISION DESCRIPTION |
|---|---|---|---|
| A | 29/03/2022 | M. Santos | ISSUED FOR STAGE 1 SUBMISSION |

This drawing is confidential and shall only be used for the purpose of this project. The signing of this title block confirms the design and drafting of this project have been prepared and checked in accordance with the Alliance quality assurance system to ISO 9001. Printed copies of this document are UNCONTROLLED. Do not scale from this drawing

| | | | |
|---|---|---|---|
| Designed | D. deAbrew | Checked | D. Angus |
| Drawn | M. Santos | Checked | M. Dalvi |
| Approved | S. Jones | | |
| Date | 29/03/2022 | Approver Signature | |

Scale Bar 0 12.5 25 m A1 1:500 A3 1:1000

KEY PLAN

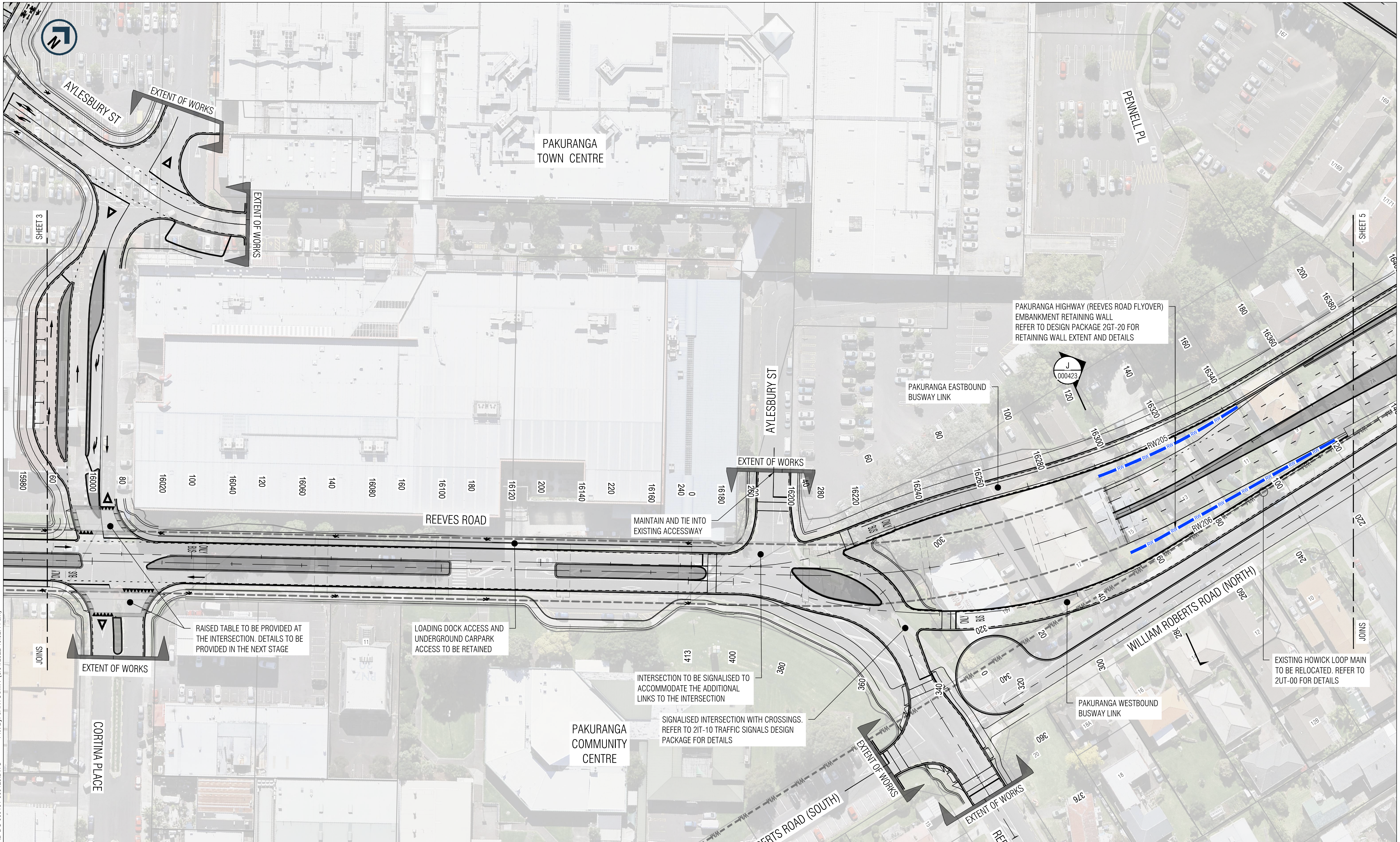
AUCKLAND MANUKAU EASTERN TRANSPORT INITIATIVE
EASTERN BUSWAY ALLIANCE
(PAKURANGA TO BOTANY)

Eastern Busway

Drawing Status: STAGE 1
Horizontal Datum: NZGD 2000 MOUNT EDEN CIRCUIT
Vertical Datum: 2016 NEW ZEALAND
A1 SCALE 1:500 A3 SCALE 1:1000

Design Package: ROADWORK GEOMETRIC DESIGN
Drawing Title: PAKURANGA HIGHWAY / REEVES ROAD GENERAL ARRANGEMENT PLAN SHEET 3 OF 5
Drawing Number: EB-2-D-2-RD-DG-000123
Revision: A

ORIGINAL SIZE A1 ORIGINAL IN COLOUR




PACKAGE No. 2RD-00

NOT FOR CONSTRUCTION

## NOTES

1. DO NOT SCALE OFF THESE DRAWINGS.
2. ALL DIMENSIONS AND DISTANCES ARE IN METRES UNLESS STATED OTHERWISE.
3. REFER TO DRAWINGS EB-2-D-2-RD-DG-000004 FOR LEGEND AND EB-2-D-2-RD-DG-000005 FOR GENERAL NOTES.

| REV | DATE | DRAWN | REVISION DESCRIPTION |
|---|---|---|---|
| A | 29/03/2022 | M. Santos | ISSUED FOR STAGE 1 SUBMISSION |

This drawing is confidential and shall only be used for the purpose of this project. The signing of this title block confirms the design and drafting of this project have been prepared and checked in accordance with the Alliance quality assurance system to ISO 9001. Printed copies of this document are UNCONTROLLED. Do not scale from this drawing

| | | | |
|---|---|---|---|
| Designed | D. deAbrew | Checked | D. Angus |
| Drawn | M. Santos | Checked | M. Dalvi |
| Approved | S. Jones | | |
| Date | 29/03/2022 | Approver Signature | |

Scale Bar: 0 12.5 25 m — A1 1:500, A3 1:1000

KEY PLAN

AUCKLAND MANUKAU EASTERN TRANSPORT INITIATIVE
EASTERN BUSWAY ALLIANCE
(PAKURANGA TO BOTANY)

Eastern Busway

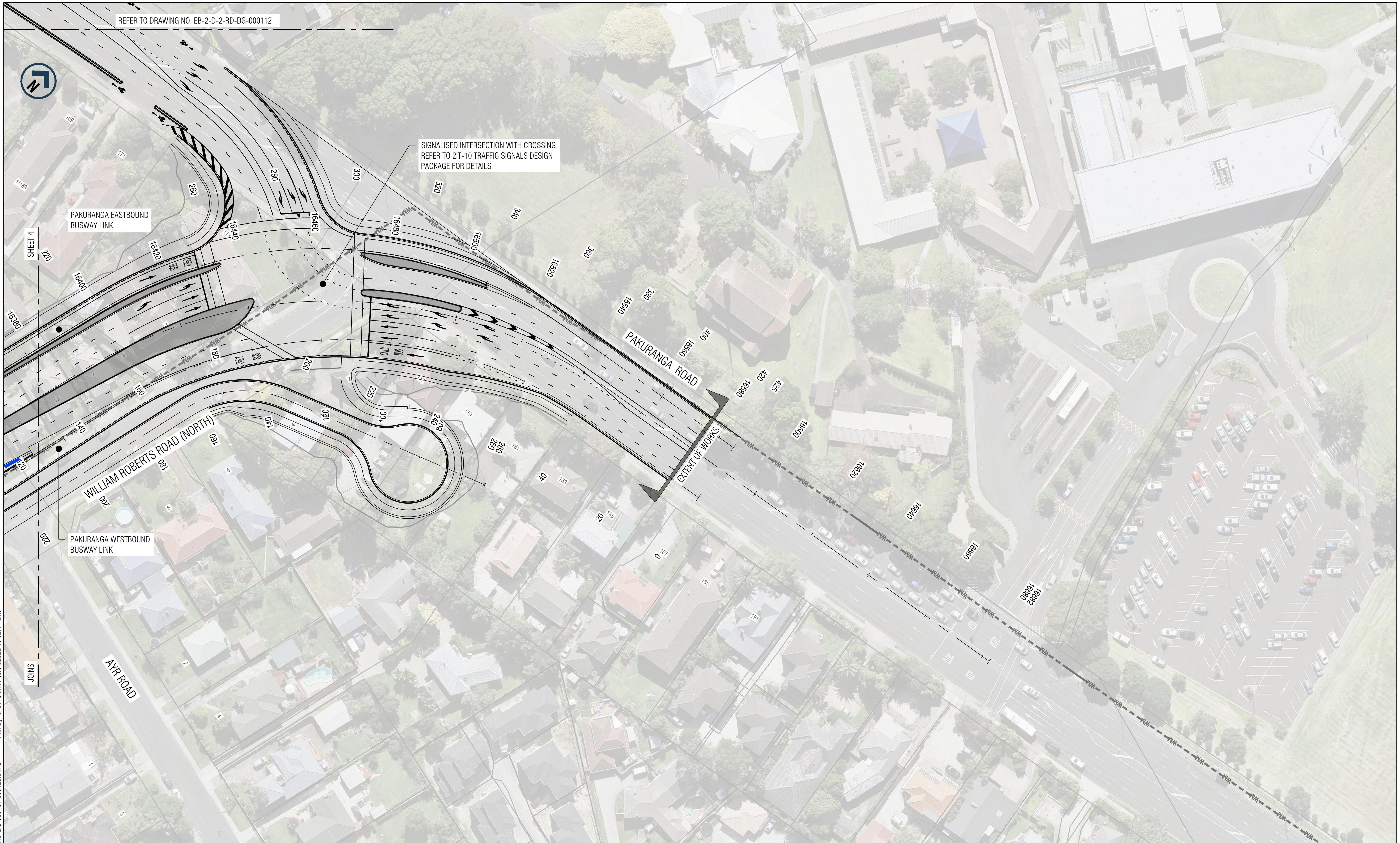
Drawing Status: STAGE 1
Horizontal Datum: NZGD 2000 MOUNT EDEN CIRCUIT
Vertical Datum: 2016 NEW ZEALAND
A1 SCALE 1:500 — A3 SCALE 1:1000

Design Package: ROADWORK GEOMETRIC DESIGN
Drawing Title: PAKURANGA HIGHWAY / REEVES ROAD GENERAL ARRANGEMENT PLAN SHEET 4 OF 5
Drawing Number: EB-2-D-2-RD-DG-000124
Revision: A

Filename: EB-2-D-2-RD-DG-000101-000125.DWG    Plot By: SANTOSMR (3/31/2022 10:02:44 am)

ORIGINAL SIZE A1

ORIGINAL IN COLOUR




## NOTES

1. DO NOT SCALE OFF THESE DRAWINGS.
2. ALL DIMENSIONS AND DISTANCES ARE IN METRES UNLESS STATED OTHERWISE.
3. REFER TO DRAWINGS EB-2-D-2-RD-DG-000004 FOR LEGEND AND EB-2-D-2-RD-DG-000005 FOR GENERAL NOTES.

PACKAGE No. 2RD-00

NOT FOR CONSTRUCTION

| REV | DATE | DRAWN | REVISION DESCRIPTION |
|---|---|---|---|
| A | 29/03/2022 | M. Santos | ISSUED FOR STAGE 1 SUBMISSION |

This drawing is confidential and shall only be used for the purpose of this project. The signing of this title block confirms the design and drafting of this project have been prepared and checked in accordance with the Alliance quality assurance system to ISO 9001. Printed copies of this document are UNCONTROLLED. Do not scale from this drawing

| | | | |
|---|---|---|---|
| Designed | D. deAbrew | Checked | D. Angus |
| Drawn | M. Santos | Checked | M. Dalvi |
| Approved | S. Jones | | |
| Date | 29/03/2022 | Approver Signature | |

Scale Bar: 0 – 12.5 – 25 m; A1 1:500; A3 1:1000

KEY PLAN

**AUCKLAND MANUKAU EASTERN TRANSPORT INITIATIVE**
**EASTERN BUSWAY ALLIANCE**
**(PAKURANGA TO BOTANY)**

Eastern Busway

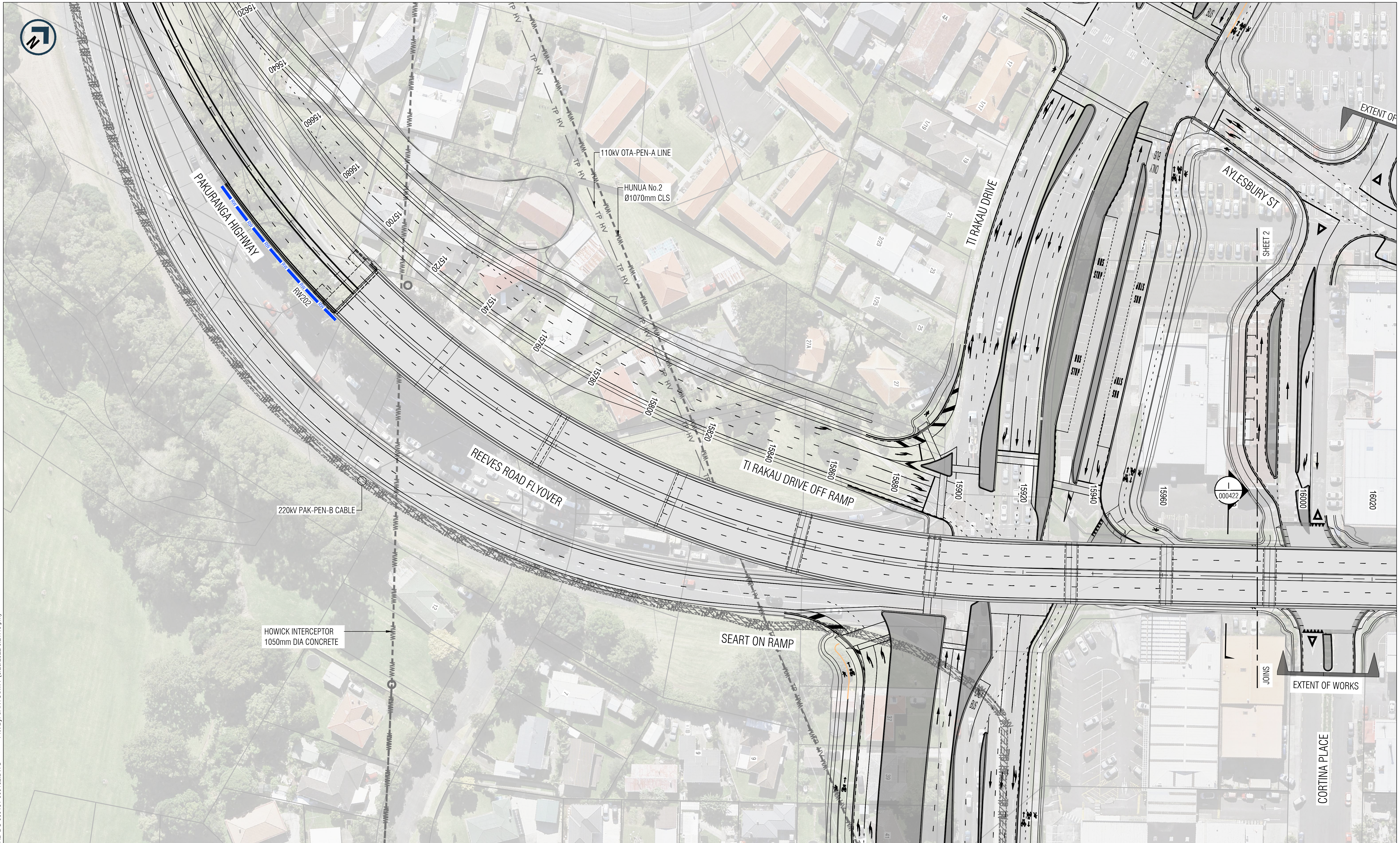
| | |
|---|---|
| Drawing Status | STAGE 1 |
| Horizontal Datum | NZGD 2000 MOUNT EDEN CIRCUIT |
| Vertical Datum | 2016 NEW ZEALAND |
| A1 SCALE | 1:500 |
| A3 SCALE | 1:1000 |
| Design Package | ROADWORK GEOMETRIC DESIGN |
| Drawing Title | PAKURANGA HIGHWAY / REEVES ROAD GENERAL ARRANGEMENT PLAN SHEET 5 OF 5 |
| Drawing Number | EB-2-D-2-RD-DG-000125 |
| Revision | A |

Filename: EB-2-D-2-RD-DG-000101-000125.DWG

Plot By: SANTOSMR (3/31/2022 10:02:44 am)

ORIGINAL SIZE A1

ORIGINAL IN COLOUR




Filename: EB-2-D-2-RD-DG-000131-000132.DWG Plot By: SANTOSMR (3/29/2022 6:21:40 pm)

NOTES

1. DO NOT SCALE OFF THESE DRAWINGS.
2. ALL DIMENSIONS AND DISTANCES ARE IN METRES UNLESS STATED OTHERWISE.
3. REFER TO DRAWINGS EB-2-D-2-RD-DG-000004 FOR LEGEND AND EB-2-D-2-RD-DG-000005 FOR GENERAL NOTES.

PACKAGE No. 2RD-00

NOT FOR CONSTRUCTION

| REV | DATE | DRAWN | REVISION DESCRIPTION |
|---|---|---|---|
| A | 29/03/2022 | M. Santos | ISSUED FOR STAGE 1 SUBMISSION |

A1 ORIGINAL SIZE

ORIGINAL IN COLOUR

This drawing is confidential and shall only be used for the purpose of this project. The signing of this title block confirms the design and drafting of this project have been prepared and checked in accordance with the Alliance quality assurance system to ISO 9001. Printed copies of this document are UNCONTROLLED. Do not scale from this drawing

| | | | |
|---|---|---|---|
| Designed | D. deAbrew | Checked | D. Angus |
| Drawn | M. Santos | Checked | M. Dalvi |
| Approved | S. Jones | | |
| Date | 29/03/2022 | Approver Signature | |

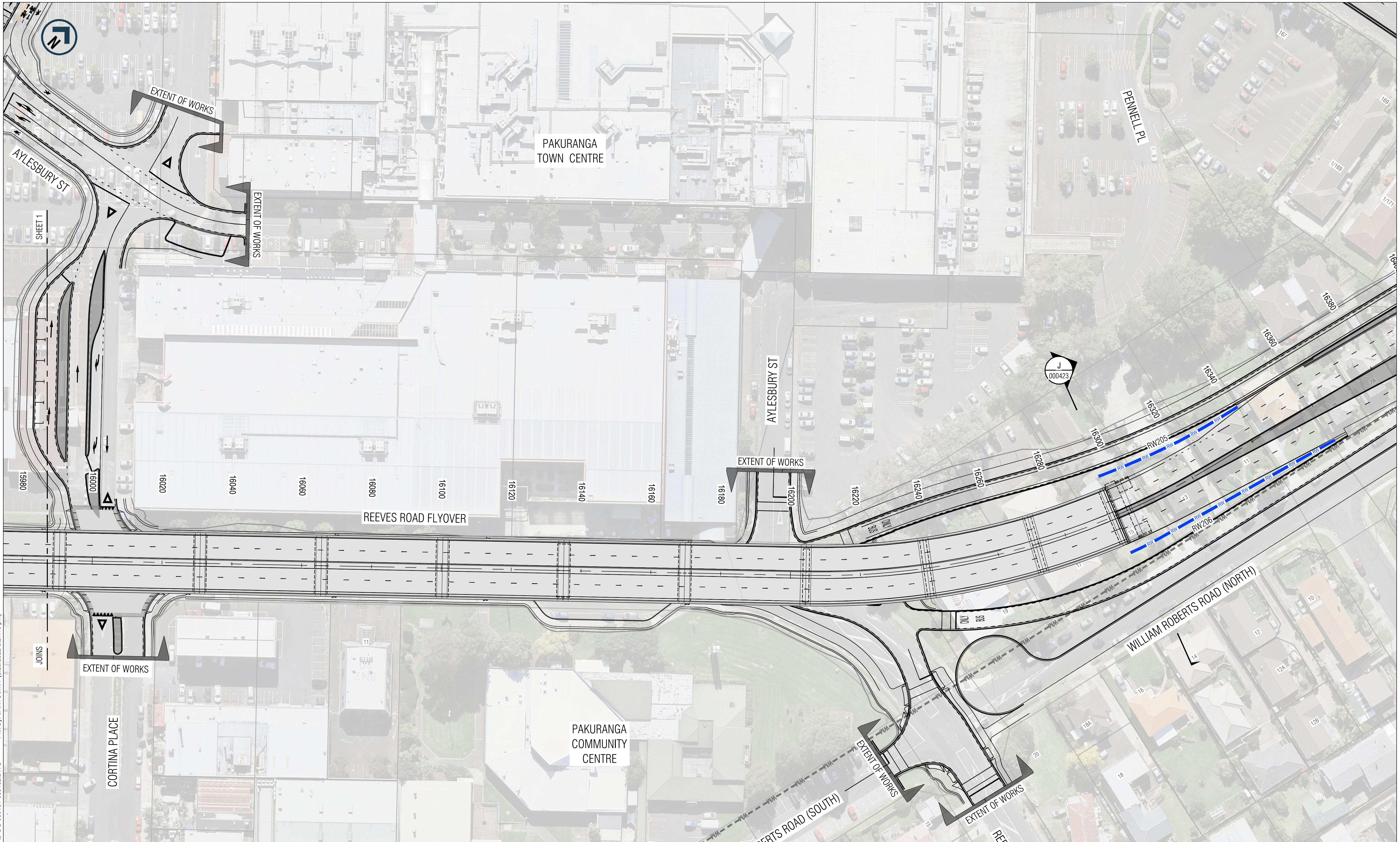
Scale Bar: 0 12.5 25 m — A1 1:500, A3 1:1000

KEY PLAN

AUCKLAND MANUKAU EASTERN TRANSPORT INITIATIVE
EASTERN BUSWAY ALLIANCE
(PAKURANGA TO BOTANY)

Eastern Busway

| | |
|---|---|
| Drawing Status | STAGE 1 |
| Horizontal Datum | NZGD 2000 MOUNT EDEN CIRCUIT |
| Vertical Datum | 2016 NEW ZEALAND |
| A1 SCALE 1:500 | A3 SCALE 1:1000 |
| Design Package | ROADWORK GEOMETRIC DESIGN |
| Drawing Title | REEVES ROAD FLYOVER GENERAL ARRANGEMENT PLAN SHEET 1 OF 2 |
| Drawing Number | EB-2-D-2-RD-DG-000131 |
| Revision | A |




## NOTES

1. DO NOT SCALE OFF THESE DRAWINGS.
2. ALL DIMENSIONS AND DISTANCES ARE IN METRES UNLESS STATED OTHERWISE.
3. REFER TO DRAWINGS EB-2-D-2-RD-DG-000004 FOR LEGEND AND EB-2-D-2-RD-DG-000005 FOR GENERAL NOTES.

PACKAGE No. 2RD-00

NOT FOR CONSTRUCTION

Filename: EB-2-D-2-RD-DG-000131-000132.DWG

Plot By: SANTOSMR (3/29/2022 6:21:40 pm)

| REV | DATE | DRAWN | REVISION DESCRIPTION |
|---|---|---|---|
| A | 29/03/2022 | M. Santos | ISSUED FOR STAGE 1 SUBMISSION |

ORIGINAL SIZE A1

ORIGINAL IN COLOUR

This drawing is confidential and shall only be used for the purpose of this project. The signing of this title block confirms the design and drafting of this project have been prepared and checked in accordance with the Alliance quality assurance system to ISO 9001. Printed copies of this document are UNCONTROLLED. Do not scale from this drawing

| | | | |
|---|---|---|---|
| Designed | D. deAbrew | Checked | D. Angus |
| Drawn | M. Santos | Checked | M. Dalvi |
| Approved | S. Jones | | |
| Date | 29/03/2022 | | Approver Signature |

Scale Bar: 0 12.5 25 m — A1 1:500, A3 1:1000

KEY PLAN

AUCKLAND MANUKAU EASTERN TRANSPORT INITIATIVE
EASTERN BUSWAY ALLIANCE
(PAKURANGA TO BOTANY)

Eastern Busway

| | |
|---|---|
| Drawing Status | STAGE 1 |
| Horizontal Datum | NZGD 2000 MOUNT EDEN CIRCUIT |
| Vertical Datum | 2016 NEW ZEALAND |
| A1 SCALE 1:500 | A3 SCALE 1:1000 |

Design Package: ROADWORK GEOMETRIC DESIGN

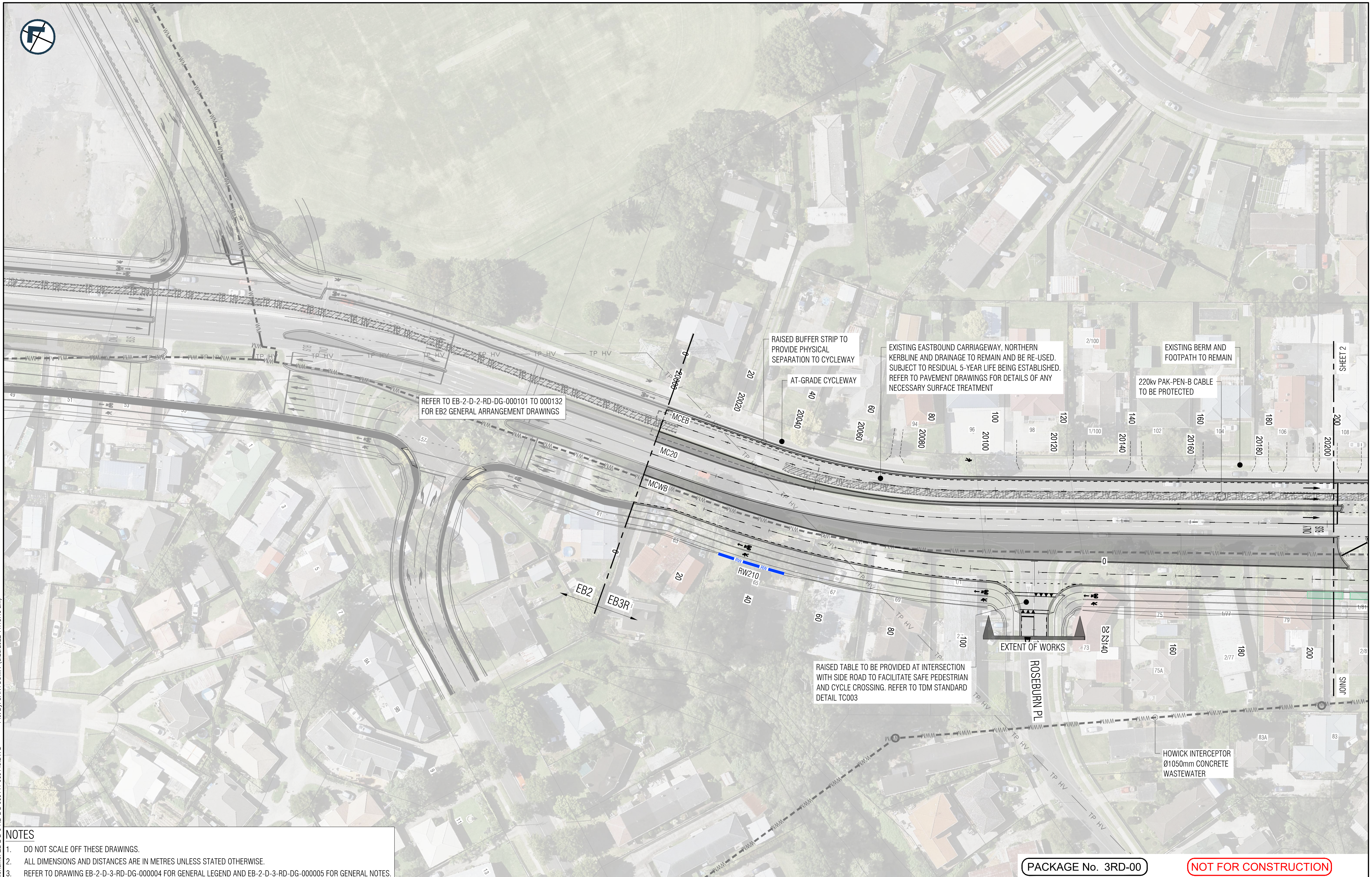
Drawing Title: REEVES ROAD FLYOVER GENERAL ARRANGEMENT PLAN SHEET 2 OF 2

Drawing Number: EB-2-D-2-RD-DG-000132

Revision: A

# Appendix C

**EB3R General Arrangement Plans**




NOTES
1. DO NOT SCALE OFF THESE DRAWINGS.
2. ALL DIMENSIONS AND DISTANCES ARE IN METRES UNLESS STATED OTHERWISE.
3. REFER TO DRAWING EB-2-D-3-RD-DG-000004 FOR GENERAL LEGEND AND EB-2-D-3-RD-DG-000005 FOR GENERAL NOTES.

PACKAGE No. 3RD-00

NOT FOR CONSTRUCTION

Plot By: SANTOSMR (3/28/2022 11:18:45 am)
Filename: EB-2-D-3-RD-DG-000141-000145.DWG

| REV | DATE | DRAWN | REVISION DESCRIPTION |
|---|---|---|---|
| A | 28/03/2022 | M. Santos | ISSUED FOR STAGE 1 SUBMISSION |

A1 ORIGINAL SIZE

ORIGINAL IN COLOUR



| | | | |
|---|---|---|---|
| Designed | K. Sinnathamby | Checked | D. Angus |
| Drawn | M. Santos | Checked | M. Dalvi |
| Approved | S. Jones | | |
| Date | 28/03/2022 | Approver Signature | |

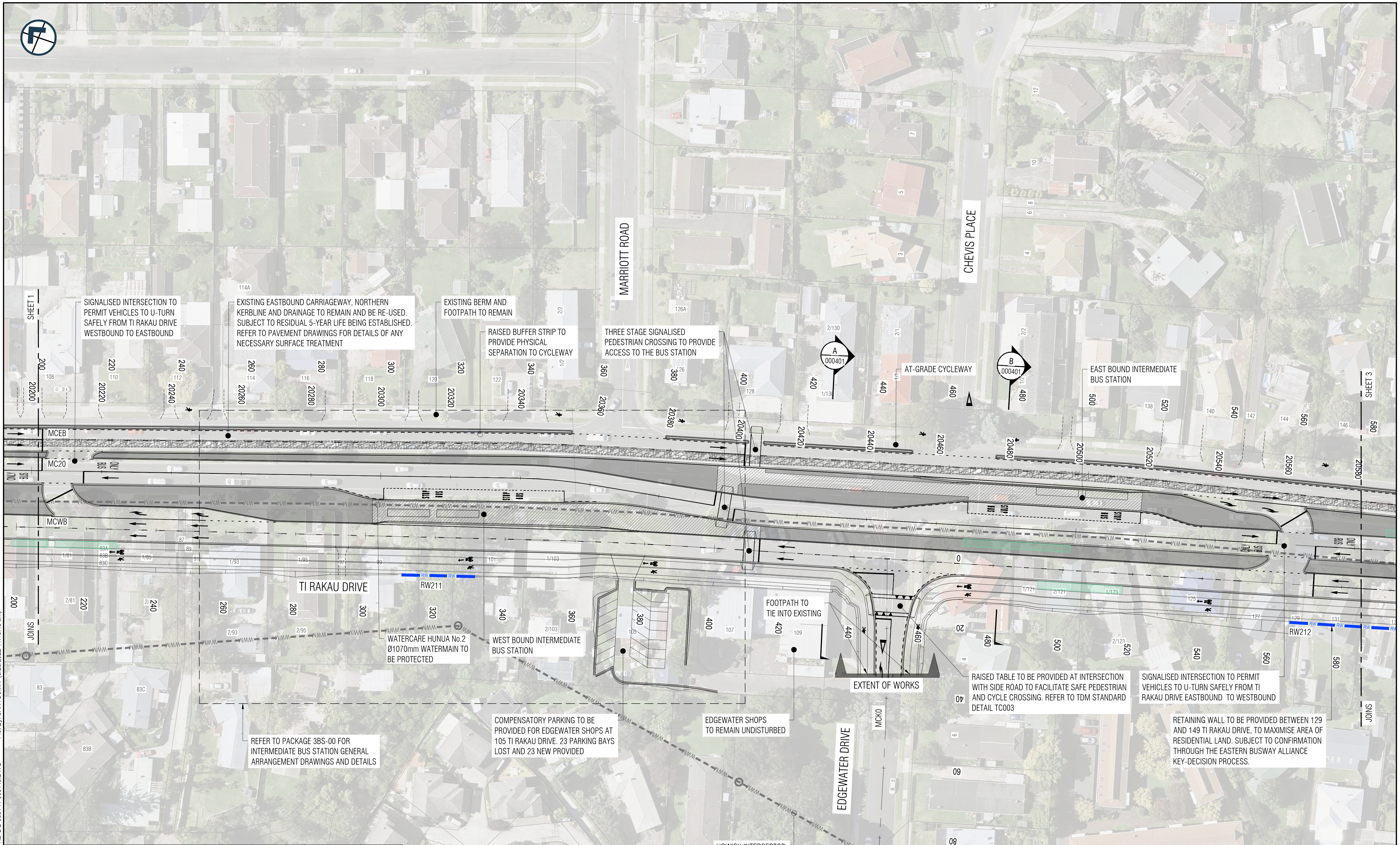
Scale Bar: 0 12.5 25 m — A1 1:500, A3 1:1000

KEY PLAN

AUCKLAND MANUKAU EASTERN TRANSPORT INITIATIVE
EASTERN BUSWAY ALLIANCE
(PAKURANGA TO BOTANY)

AT Eastern Busway

| | |
|---|---|
| Drawing Status | STAGE 1 |
| Horizontal Datum | NZGD 2000 MOUNT EDEN CIRCUIT |
| Vertical Datum | 2016 NEW ZEALAND |
| A1 SCALE | 1:500 |
| A3 SCALE | 1:1000 |
| Design Package | ROADWORK GEOMETRIC DESIGN |
| Drawing Title | TI RAKAU DRIVE GENERAL ARRANGEMENT PLAN SHEET 1 OF 5 |
| Drawing Number | EB-2-D-3-RD-DG-000101 |
| Revision | A |




## NOTES

1. DO NOT SCALE OFF THESE DRAWINGS.
2. ALL DIMENSIONS AND DISTANCES ARE IN METRES UNLESS STATED OTHERWISE.
3. REFER TO DRAWING EB-2-D-3-RD-DG-000004 FOR GENERAL LEGEND AND EB-2-D-3-RD-DG-000005 FOR GENERAL NOTES.

Filename: EB-2-D-3-RD-DG-000141-000145.DWG Plot By: SANTOSMR (3/28/2022 11:18:45 am)

| REV | DATE | DRAWN | REVISION DESCRIPTION |
|---|---|---|---|
| A | 28/03/2022 | M. Santos | ISSUED FOR STAGE 1 SUBMISSION |

This drawing is confidential and shall only be used for the purpose of this project. The signing of this title block confirms the design and drafting of this project have been prepared and checked in accordance with the Alliance quality assurance system to ISO 9001. Printed copies of this document are UNCONTROLLED. Do not scale from this drawing

| | | | |
|---|---|---|---|
| Designed | K. Sinnathamby | Checked | D. Angus |
| Drawn | M. Santos | Checked | M. Dalvi |
| Approved | S. Jones | | |
| Date | 28/03/2022 | Approver Signature | |

Scale Bar: 0 12.5 25 m — A1 1:500 A3 1:1000

KEY PLAN

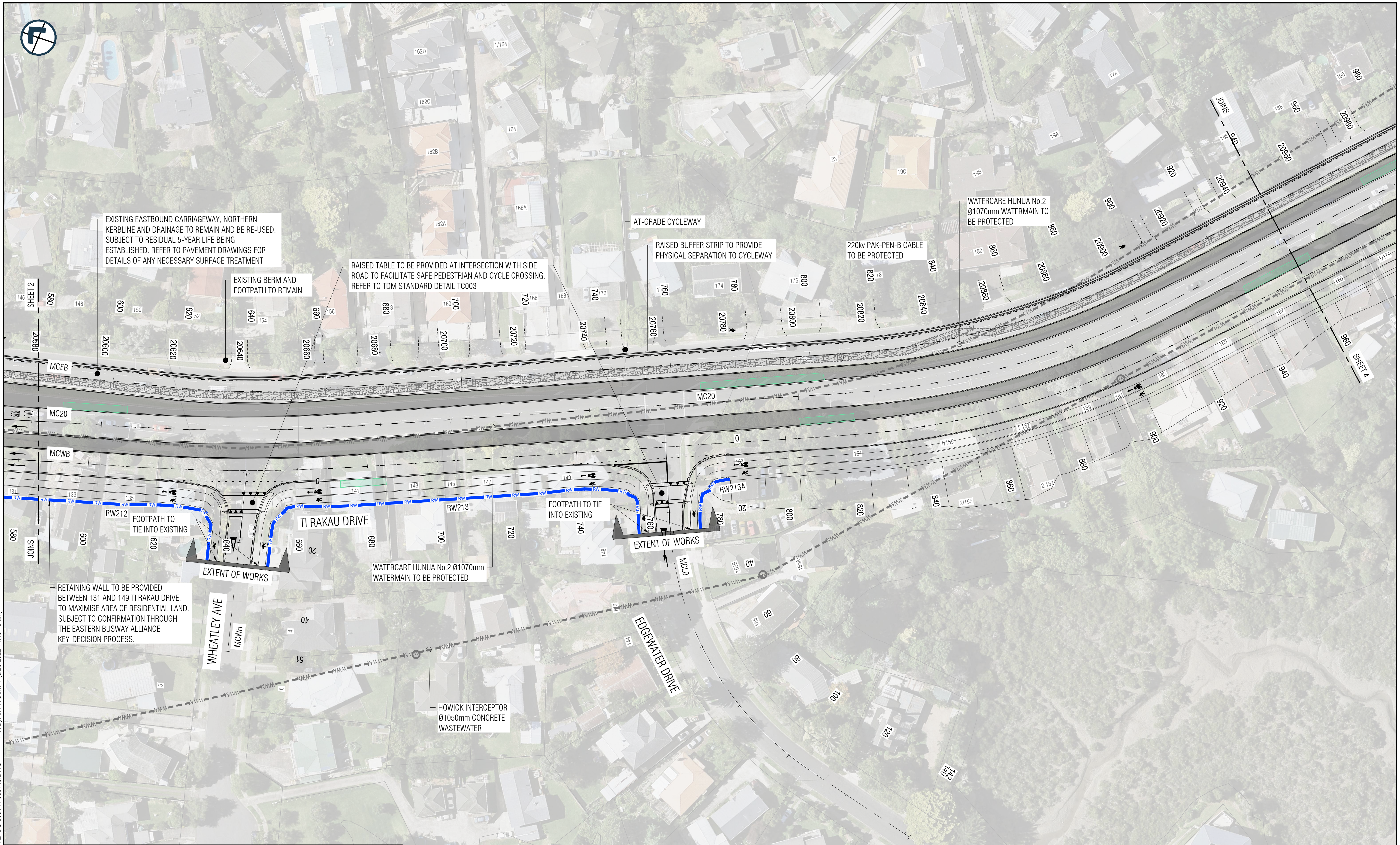
AUCKLAND MANUKAU EASTERN TRANSPORT INITIATIVE
EASTERN BUSWAY ALLIANCE
(PAKURANGA TO BOTANY)

Eastern Busway

Drawing Status: STAGE 1
Horizontal Datum: NZGD 2000 MOUNT EDEN CIRCUIT
Vertical Datum: 2016 NEW ZEALAND
A1 SCALE 1:500 A3 SCALE 1:1000

Design Package: ROADWORK GEOMETRIC DESIGN
Drawing Title: TI RAKAU DRIVE GENERAL ARRANGEMENT PLAN SHEET 2 OF 5
Drawing Number: EB-2-D-3-RD-DG-000102
Revision: A

ORIGINAL SIZE A1
ORIGINAL IN COLOUR




## NOTES

1. DO NOT SCALE OFF THESE DRAWINGS.
2. ALL DIMENSIONS AND DISTANCES ARE IN METRES UNLESS STATED OTHERWISE.
3. REFER TO DRAWING EB-2-D-3-RD-DG-000004 FOR GENERAL LEGEND AND EB-2-D-3-RD-DG-000005 FOR GENERAL NOTES.

PACKAGE No. 3RD-00

NOT FOR CONSTRUCTION

Filename: EB-2-D-3-RD-DG-000141-000145.DWG

Plot By: SANTOSMR (3/28/2022 11:18:45 am)

| REV | DATE | DRAWN | REVISION DESCRIPTION |
|---|---|---|---|
| A | 28/03/2022 | M. Santos | ISSUED FOR STAGE 1 SUBMISSION |

ORIGINAL SIZE A1

ORIGINAL IN COLOUR



| | | | |
|---|---|---|---|
| Designed | K. Sinnathamby | Checked | D. Angus |
| Drawn | M. Santos | Checked | M. Dalvi |
| Approved | S. Jones | | |
| Date | 28/03/2022 | Approver Signature | |

Scale Bar: 0 — 12.5 — 25 m; A1 1:500; A3 1:1000

KEY PLAN

AUCKLAND MANUKAU EASTERN TRANSPORT INITIATIVE
EASTERN BUSWAY ALLIANCE
(PAKURANGA TO BOTANY)

Eastern Busway

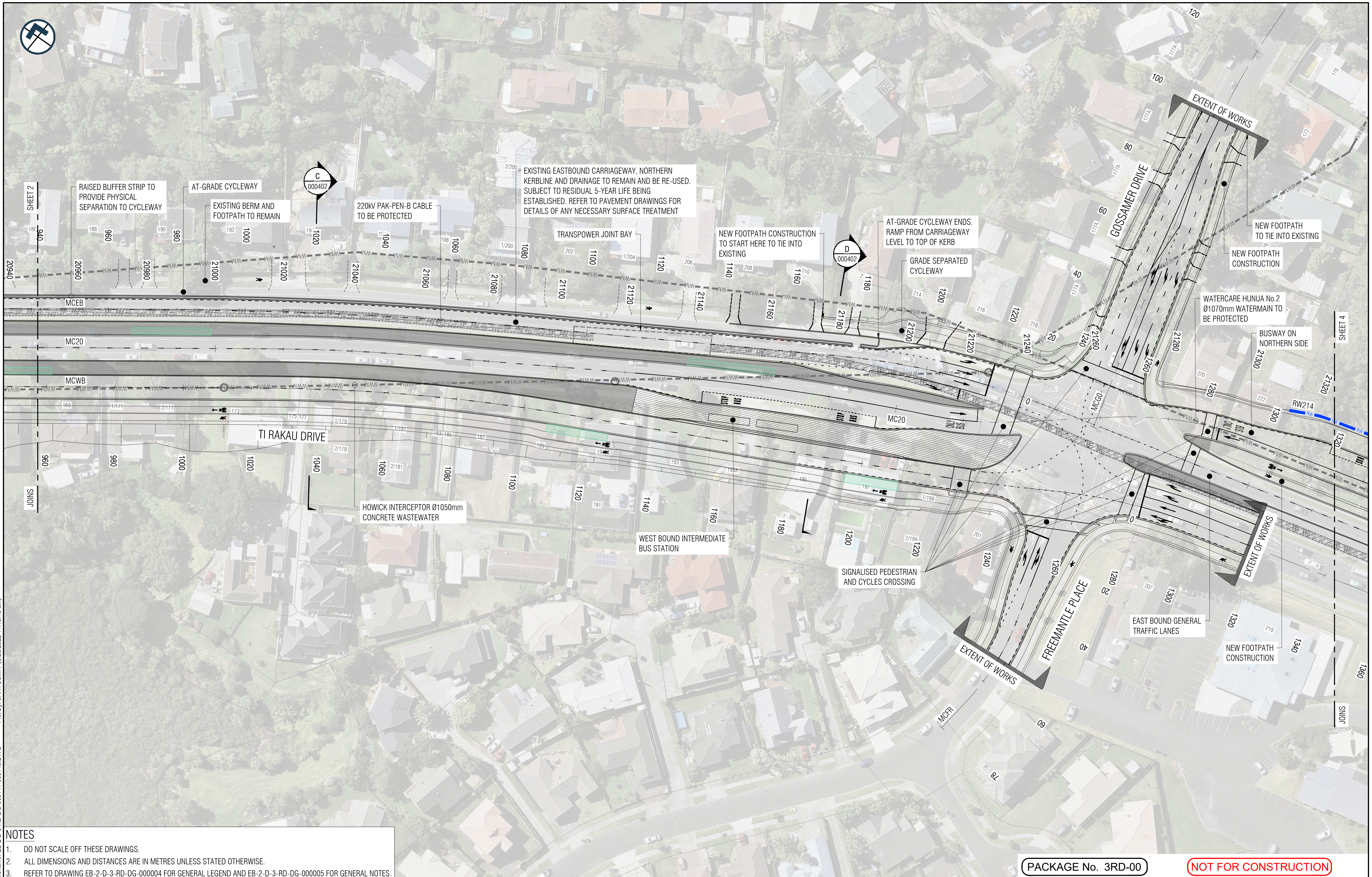
| | |
|---|---|
| Drawing Status | STAGE 1 |
| Horizontal Datum | NZGD 2000 MOUNT EDEN CIRCUIT |
| Vertical Datum | 2016 NEW ZEALAND |
| A1 SCALE 1:500 | A3 SCALE 1:1000 |

Design Package: ROADWORK GEOMETRIC DESIGN

Drawing Title: TI RAKAU DRIVE GENERAL ARRANGEMENT PLAN SHEET 3 OF 5

Drawing Number: EB-2-D-3-RD-DG-000103

Revision: A




## NOTES

1. DO NOT SCALE OFF THESE DRAWINGS.
2. ALL DIMENSIONS AND DISTANCES ARE IN METRES UNLESS STATED OTHERWISE.
3. REFER TO DRAWING EB-2-D-3-RD-DG-000004 FOR GENERAL LEGEND AND EB-2-D-3-RD-DG-000005 FOR GENERAL NOTES.

PACKAGE No. 3RD-00

NOT FOR CONSTRUCTION

Filename: EB-2-D-3-RD-DG-000141-000145.DWG    Plot By: SANTOSMR (3/28/2022 11:18:45 am)

| REV | DATE | DRAWN | REVISION DESCRIPTION |
|---|---|---|---|
| A | 28/03/2022 | M. Santos | ISSUED FOR STAGE 1 SUBMISSION |

ORIGINAL SIZE A1

ORIGINAL IN COLOUR

This drawing is confidential and shall only be used for the purpose of this project. The signing of this title block confirms the design and drafting of this project have been prepared and checked in accordance with the Alliance quality assurance system to ISO 9001. Printed copies of this document are UNCONTROLLED. Do not scale from this drawing

| | | | |
|---|---|---|---|
| Designed | K. Sinnathamby | Checked | D. Angus |
| Drawn | M. Santos | Checked | M. Dalvi |
| Approved | S. Jones | | |
| Date | 28/03/2022 | Approver Signature | |

Scale Bar 0 12.5 25 m A1 1:500 A3 1:1000

KEY PLAN

AUCKLAND MANUKAU EASTERN TRANSPORT INITIATIVE
EASTERN BUSWAY ALLIANCE
(PAKURANGA TO BOTANY)

Eastern Busway

Drawing Status: STAGE 1

Horizontal Datum: NZGD 2000 MOUNT EDEN CIRCUIT

Vertical Datum: 2016 NEW ZEALAND

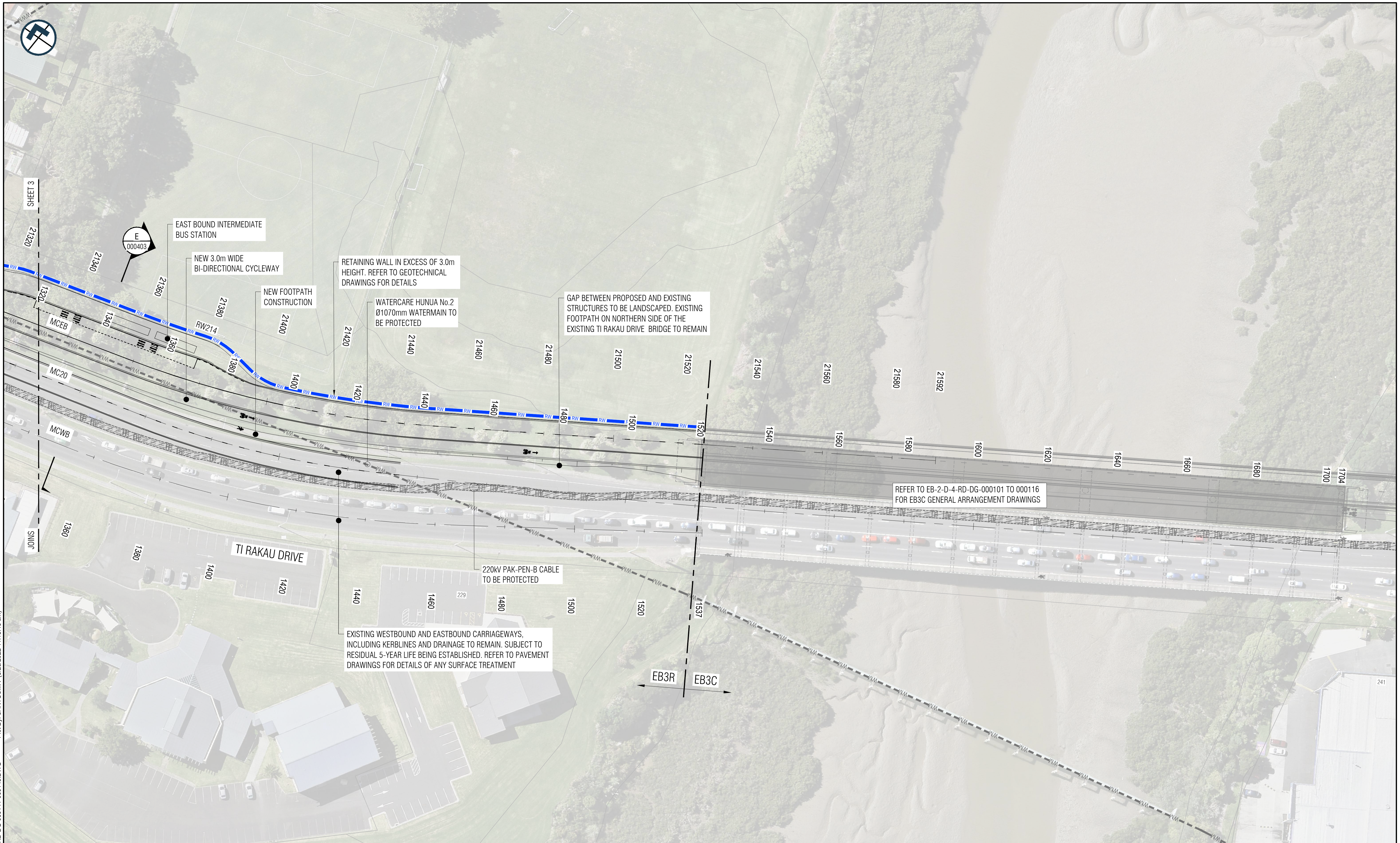
A1 SCALE 1:500 A3 SCALE 1:1000

Design Package: ROADWORK GEOMETRIC DESIGN

Drawing Title: TI RAKAU DRIVE GENERAL ARRANGEMENT PLAN SHEET 4 OF 5

Drawing Number: EB-2-D-3-RD-DG-000104

Revision: A




## NOTES

1. DO NOT SCALE OFF THESE DRAWINGS.
2. ALL DIMENSIONS AND DISTANCES ARE IN METRES UNLESS STATED OTHERWISE.
3. REFER TO DRAWING EB-2-D-3-RD-DG-000004 FOR GENERAL LEGEND AND EB-2-D-3-RD-DG-000005 FOR GENERAL NOTES.

PACKAGE No. 3RD-00

NOT FOR CONSTRUCTION

Filename: EB-2-D-3-RD-DG-000141-000145.DWG Plot By: SANTOSMR (3/28/2022 11:18:45 am)

| REV | DATE | DRAWN | REVISION DESCRIPTION |
|---|---|---|---|
| A | 28/03/2022 | M. Santos | ISSUED FOR STAGE 1 SUBMISSION |

A1 ORIGINAL SIZE

ORIGINAL IN COLOUR



| | | | |
|---|---|---|---|
| Designed | K. Sinnathamby | Checked | D. Angus |
| Drawn | M. Santos | Checked | M. Dalvi |
| Approved | S. Jones | | |
| Date | 28/03/2022 | Approver Signature | |

Scale Bar: 0 12.5 25 m — A1 1:500, A3 1:1000

KEY PLAN

AUCKLAND MANUKAU EASTERN TRANSPORT INITIATIVE
EASTERN BUSWAY ALLIANCE
(PAKURANGA TO BOTANY)

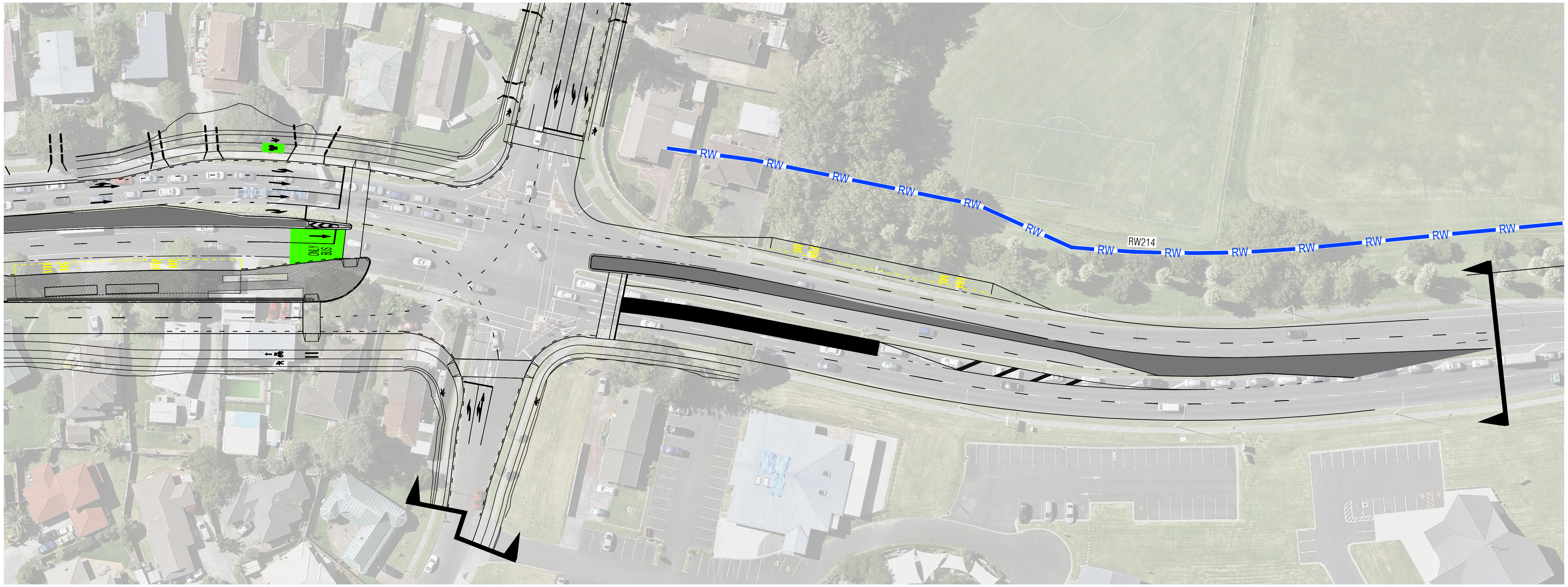
Eastern Busway

Drawing Status: STAGE 1
Horizontal Datum: NZGD 2000 MOUNT EDEN CIRCUIT
Vertical Datum: 2016 NEW ZEALAND
A1 SCALE 1:500 A3 SCALE 1:1000

Design Package: ROADWORK GEOMETRIC DESIGN

Drawing Title: TI RAKAU DRIVE
GENERAL ARRANGEMENT PLAN
SHEET 5 OF 5

Drawing Number: EB-2-D-3-RD-DG-000105
Revision: A



RW
RW214
BUS ONLY

# Appendix D

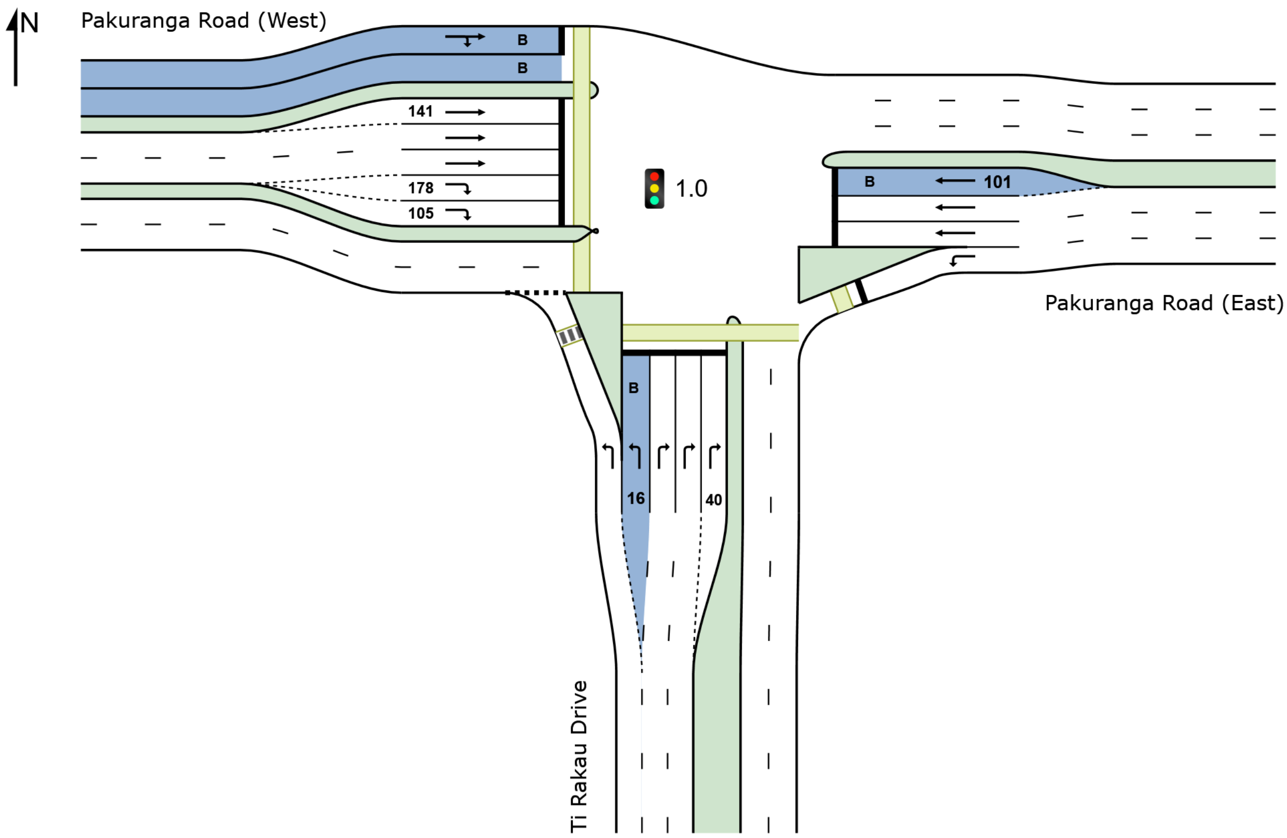
**Construction Scenario 1 – Phasing Diagrams**

# SITE LAYOUT

## Site: 1.0 [1.0 Pakuranga Rd / Ti Rakau Rd (Site Folder: General)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated

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



# PHASING SUMMARY

## Site: 1.0 [1.0 Pakuranga Rd / Ti Rakau Rd (Site Folder: General)]

## Network: N101 [Construction 1 (Network Folder: AM)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated    Cycle Time = 130 seconds (Site Practical Cycle Time)

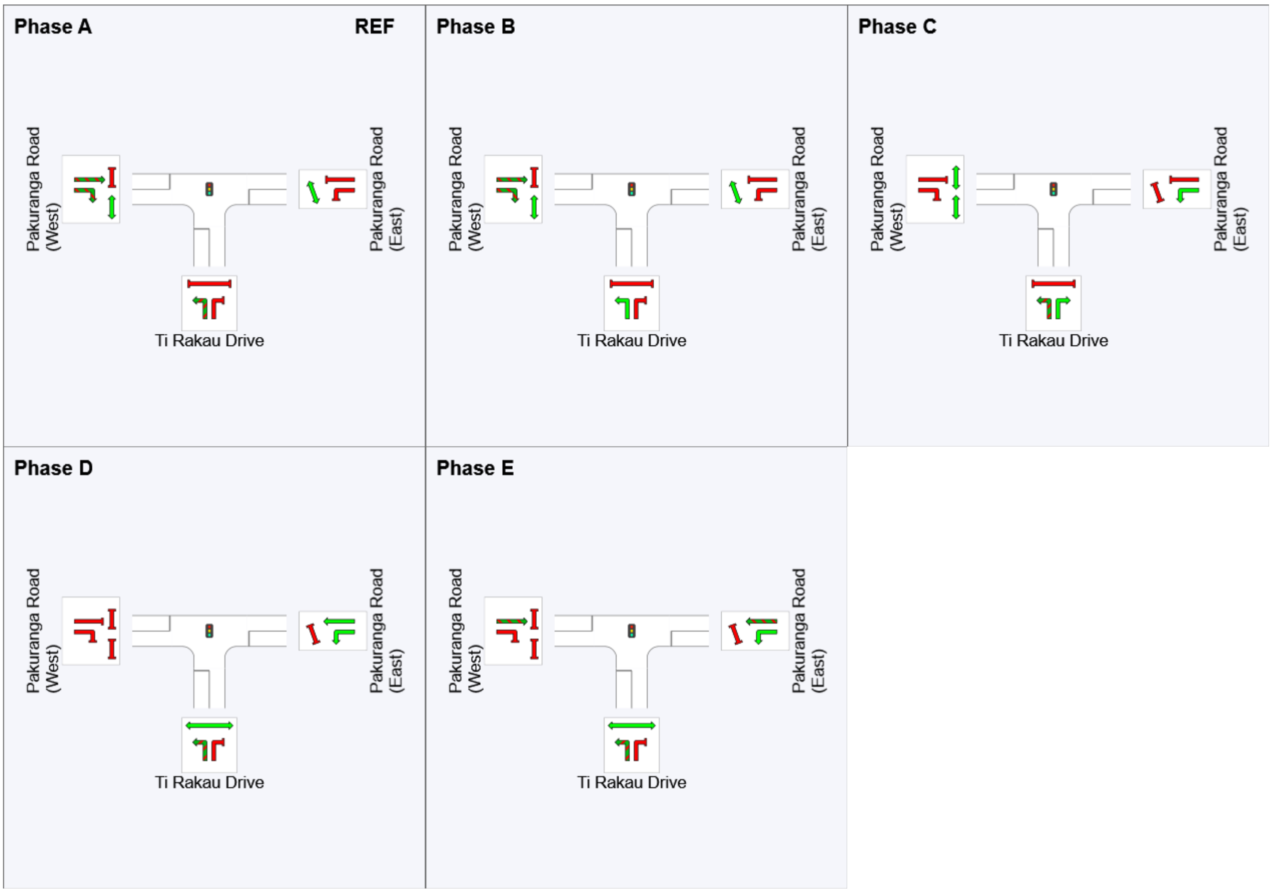
**Timings based on settings in the Site Phasing & Timing dialog**
**Phase Times determined by the program**
**Downstream lane blockage effects included in determining phase times**
**Phase Sequence: Map Extract Default**
**Reference Phase: Phase A**
**Input Phase Sequence: A, B, C, D, E**
**Output Phase Sequence: A, B, C, D, E**

## Phase Timing Summary

| Phase | A | B | C | D | E |
|---|---|---|---|---|---|
| Phase Change Time (sec) | 0 | 23 | 35 | 64 | 78 |
| Green Time (sec) | 17 | 6 | 23 | 8 | 46 |
| Phase Time (sec) | 23 | 12 | 29 | 14 | 52 |
| Phase Split | 18% | 9% | 22% | 11% | 40% |

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

## Output Phase Sequence




REF: Reference Phase
VAR: Variable Phase

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

# PHASING SUMMARY

## Site: 1.0 [1.0 Pakuranga Rd / Ti Rakau Rd (Site Folder: General)]

## Network: N101 [Construction 1 (Network Folder: PM)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 70 seconds (Site Practical Cycle Time)

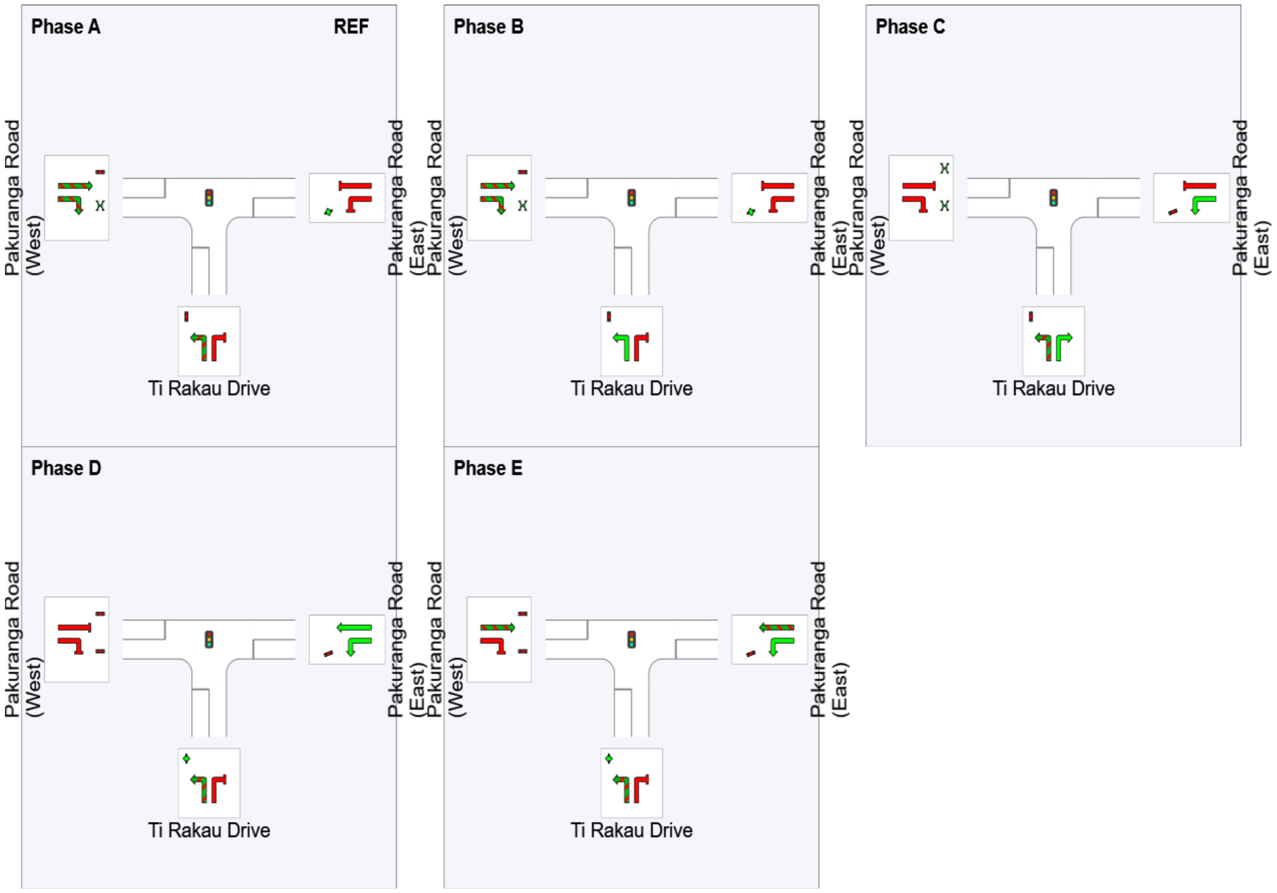
**Timings based on settings in the Site Phasing & Timing dialog**
**Phase Times determined by the program**
**Downstream lane blockage effects included in determining phase times**
**Phase Sequence: Map Extract Default**
**Reference Phase: Phase A**
**Input Phase Sequence: A, B, C, D, E**
**Output Phase Sequence: A, B, C, D, E**

### Phase Timing Summary

| Phase | A | B | C | D | E |
|---|---|---|---|---|---|
| Phase Change Time (sec) | 0 | 13 | 25 | 47 | 59 |
| Green Time (sec) | 7 | 6 | 16 | 6 | 5 |
| Phase Time (sec) | 13 | 12 | 22 | 12 | 11 |
| Phase Split | 19% | 17% | 31% | 17% | 16% |

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

### Output Phase Sequence




REF: Reference Phase
VAR: Variable Phase

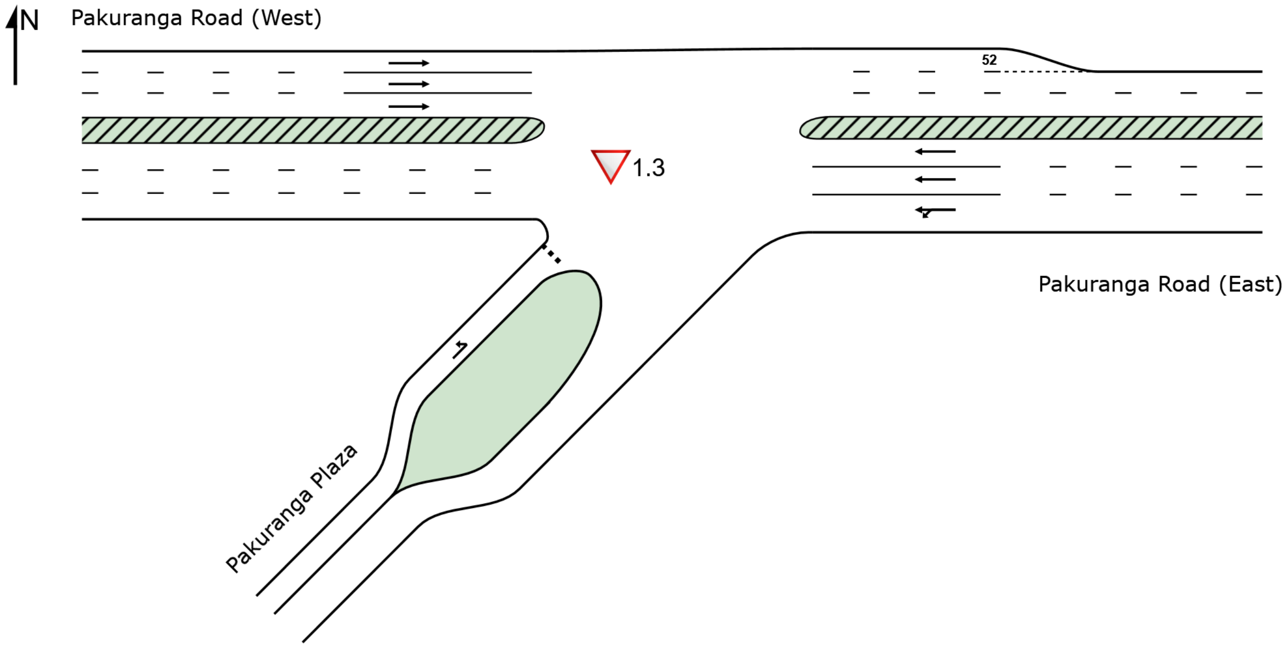
| | |
|---|---|
| Normal Movement | Permitted/Opposed |
| Slip/Bypass-Lane Movement | Opposed Slip/Bypass-Lane |
| Stopped Movement | Turn On Red |
| Other Movement Class (MC) Running | Undetected Movement |
| Mixed Running & Stopped MCs | Continuous Movement |
| Other Movement Class (MC) Stopped | Phase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

# SITE LAYOUT

## Site: 1.3 [1.3 Mall/ Pakuranga Rd WR Closure (Site Folder: General)]

New Site
Site Category: (None)
Give-Way (Two-Way)

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

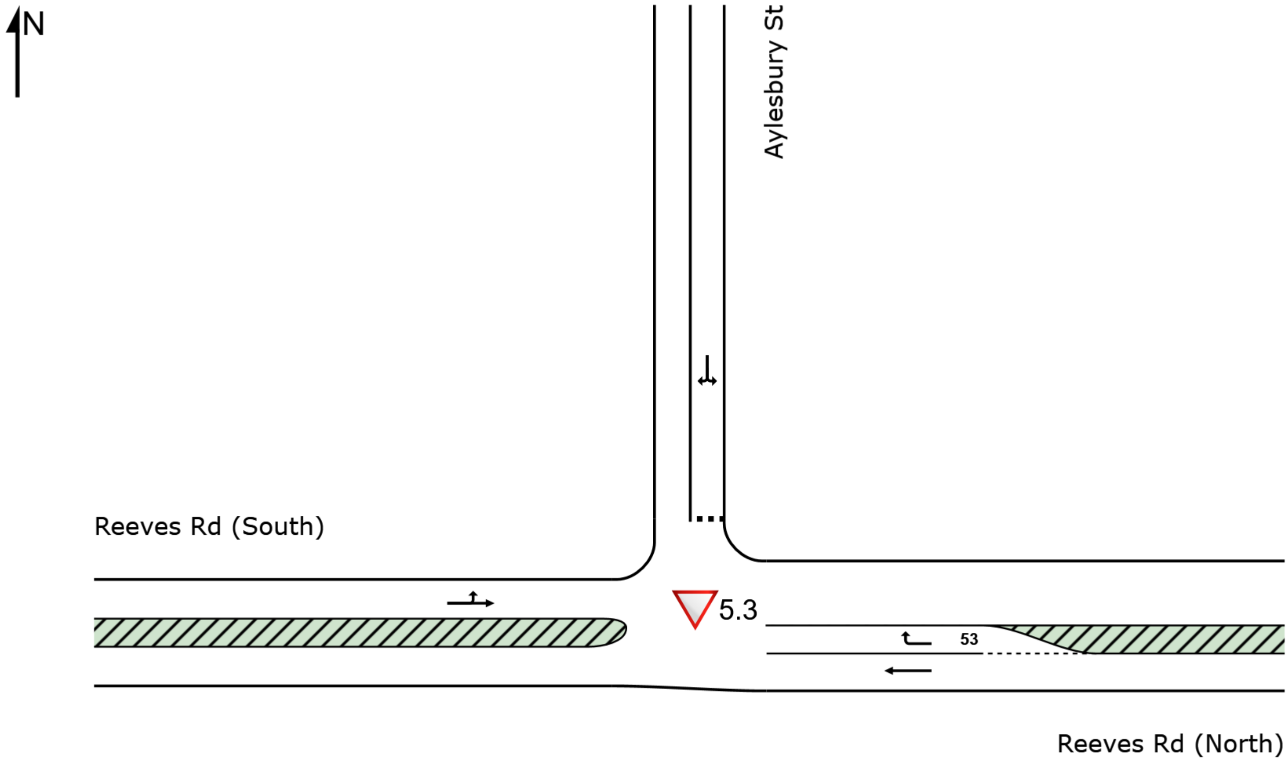


# SITE LAYOUT

## Site: 5.3 [5.3 Reeves Rd/ Aylesbury St (Site Folder: General)]

New Site
Site Category: (None)
Give-Way (Two-Way)

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

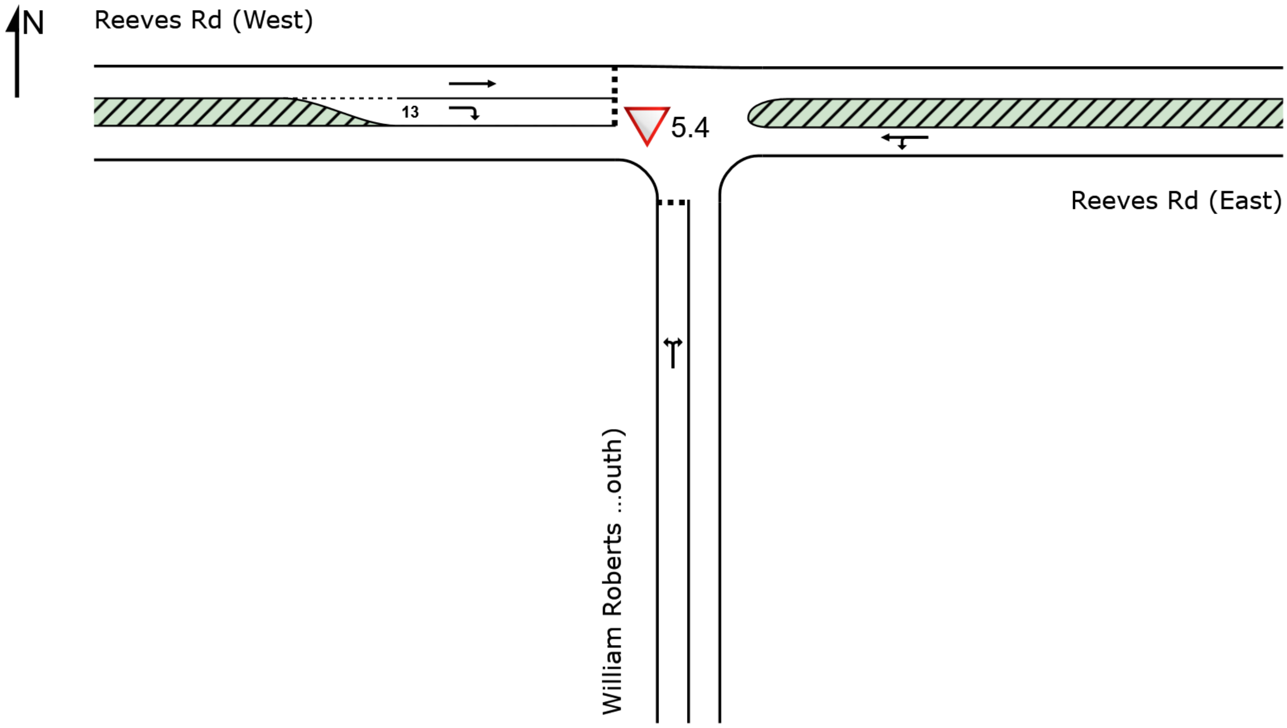


# SITE LAYOUT

## Site: 5.4 [5.4 Reeves Rd / William Roberts Rd WR Closure C (Site Folder: General)]

New Site
Site Category: (None)
Give-Way (Two-Way)

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

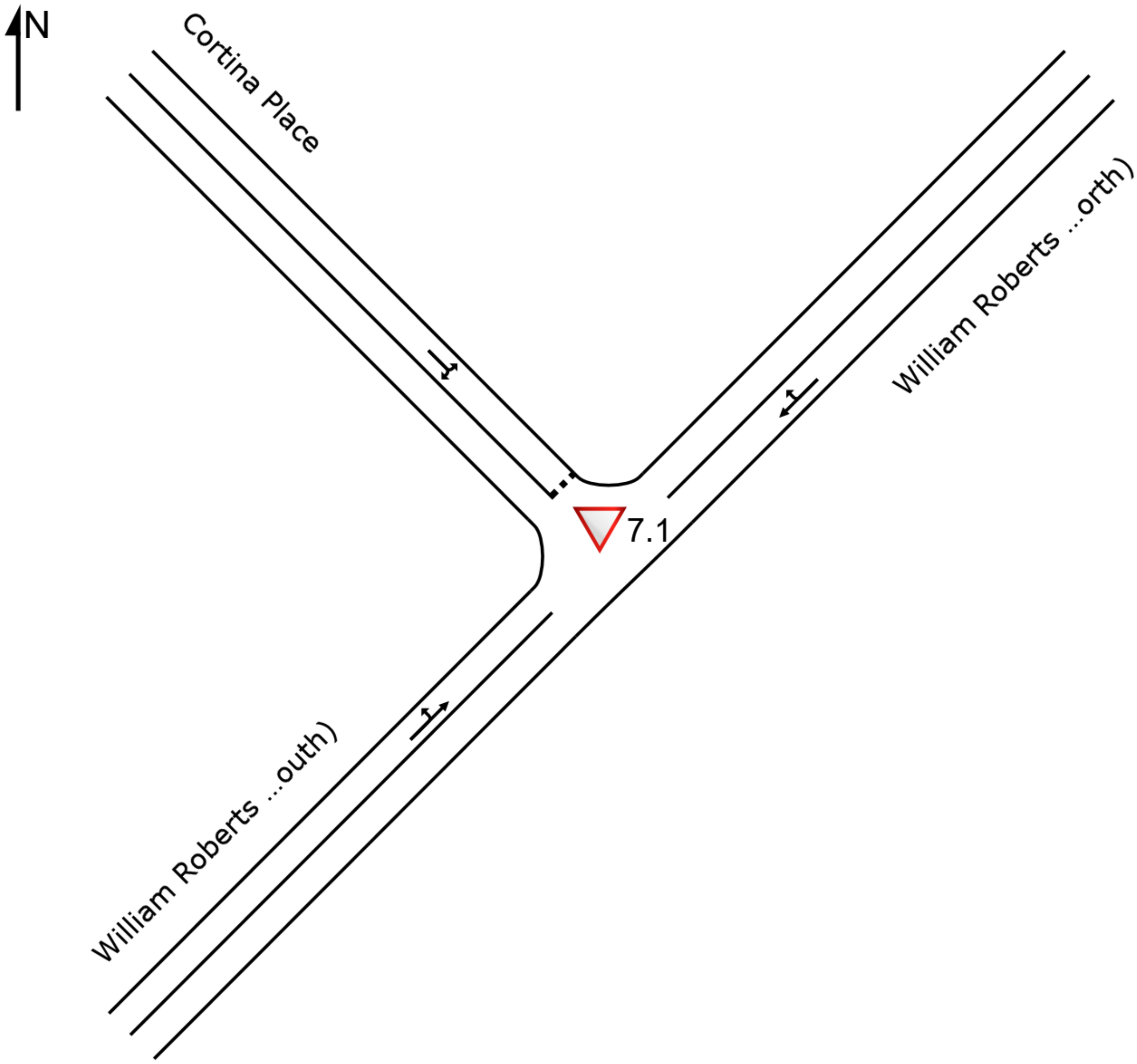


# SITE LAYOUT

## ▽ Site: 7.1 [7.1 William Roberts Rd / Cortina Pl WR Closure (Site Folder: General)]

Scheme Design
Site Category: (None)
Give-Way (Two-Way)

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

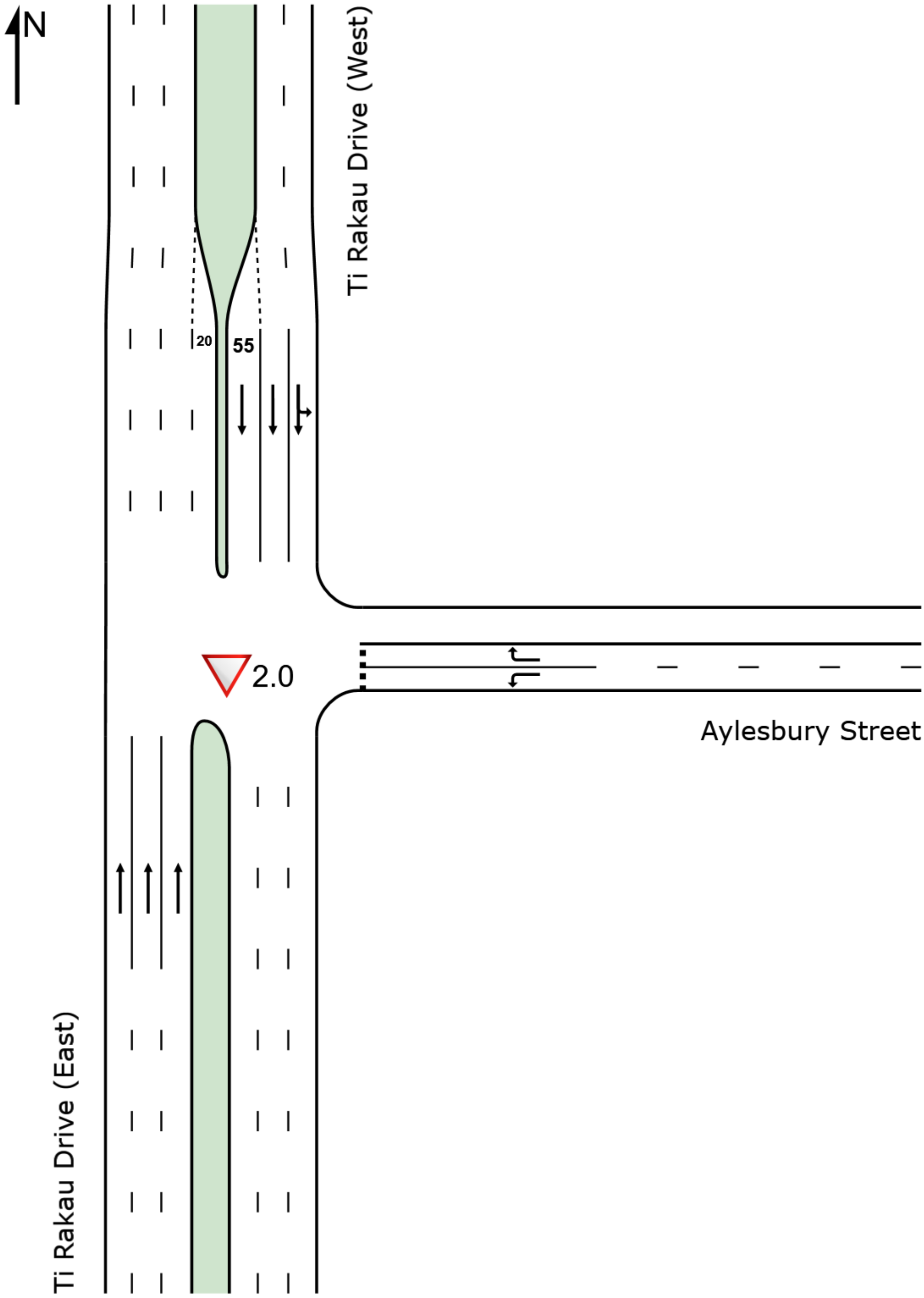


# SITE LAYOUT

## ▽ Site: 2.0 [2.0 Aylesbury St North/Ti Rakau Dr (Site Folder: General)]

New Site
Site Category: (None)
Give-Way (Two-Way)

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

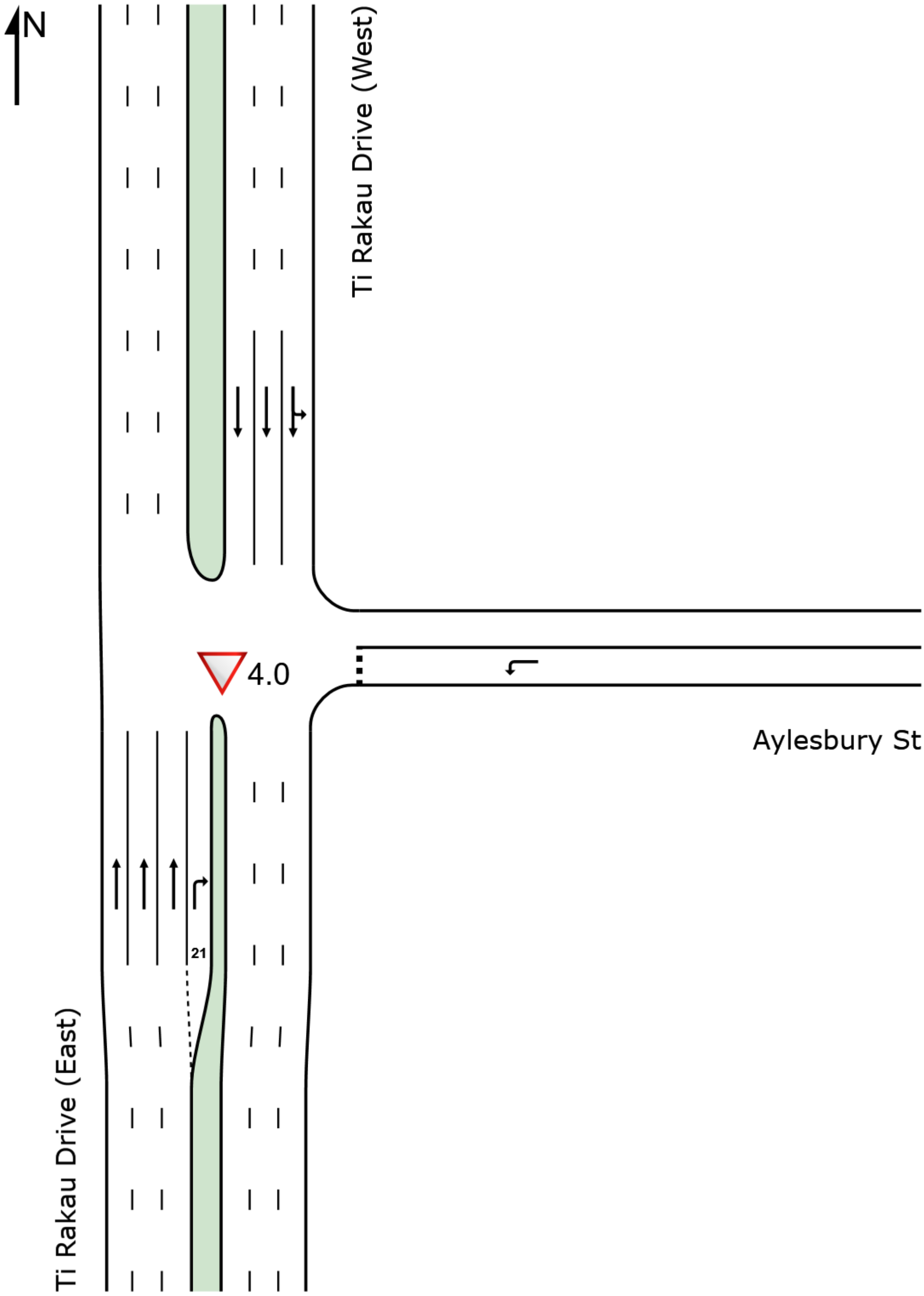


# SITE LAYOUT

## ▽ Site: 4.0 [4.0 Aylesbury St South/ Ti Rakau Dr (Site Folder: General)]

New Site
Site Category: (None)
Give-Way (Two-Way)

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

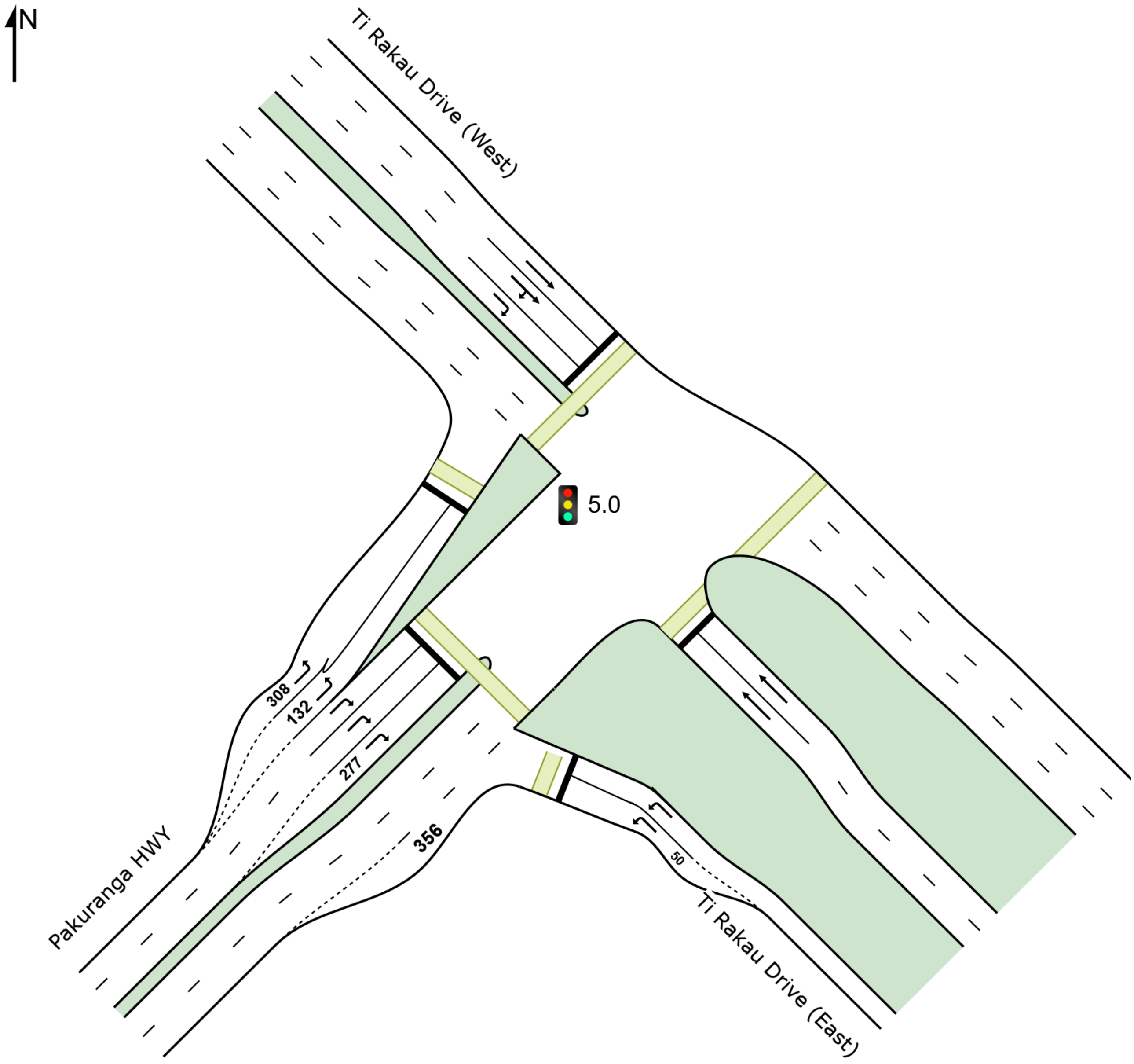


# SITE LAYOUT

## Site: 5.0 [5.0 Pakuranga HWY/ Reeves Rd Mitigation 1 C (Site Folder: General)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated

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



# PHASING SUMMARY

## Site: 5.0 [5.0 Pakuranga HWY/ Reeves Rd Mitigation 1 C (Site Folder: General)]

## Network: N101 [Construction 1 (Network Folder: AM)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated     Cycle Time = 65 seconds (Site User-Given Phase Times)

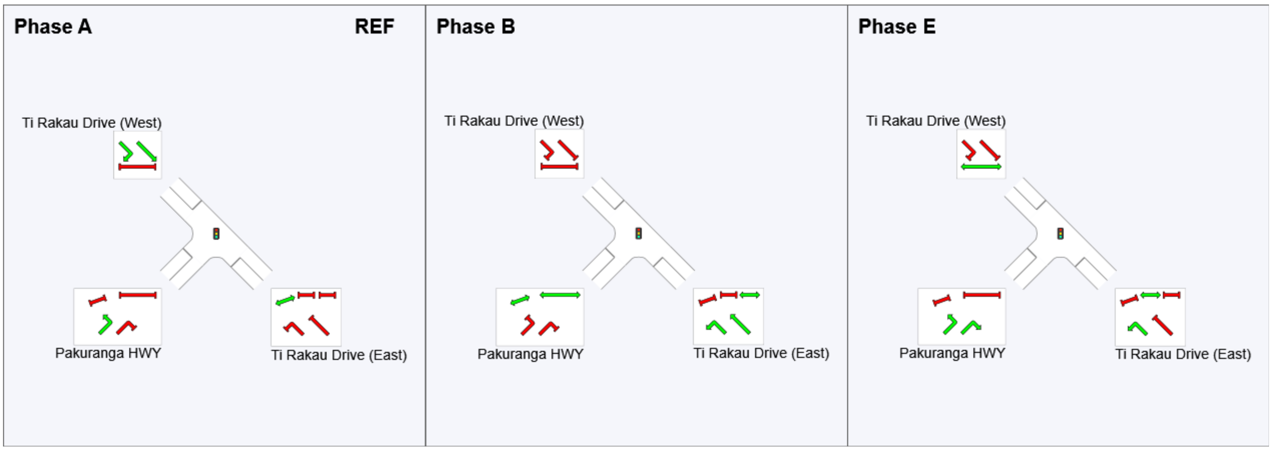
**Timings based on settings in the Site Phasing & Timing dialog**
**Phase Times specified by the user**
**Phase Sequence: Map Extract Default**
**Reference Phase: Phase A**
**Input Phase Sequence: A, B, E**
**Output Phase Sequence: A, B, E**

## Phase Timing Summary

| Phase | A | B | E |
|---|---|---|---|
| Phase Change Time (sec) | 0 | 23 | 48 |
| Green Time (sec) | 20 | 19 | 12 |
| Phase Time (sec) | 26 | 24 | 15 |
| Phase Split | 40% | 37% | 23% |

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

## Output Phase Sequence




REF: Reference Phase
VAR: Variable Phase

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


Organisation: AECOM AUSTRALIA PTY LTD | Licence: NETWORK / Enterprise | Processed: Thursday, 17 March 2022 10:06:38 pm
Project: C:\Users\jacques.vandenheever\Downloads\2028 Construction 1 AM (2).sip9

# PHASING SUMMARY

## Site: 5.0 [5.0 Pakuranga HWY/ Reeves Rd Mitigation 1 C (Site Folder: General)]

## Network: N101 [Construction 1 (Network Folder: PM)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated    Cycle Time = 40 seconds (Site Practical Cycle Time)

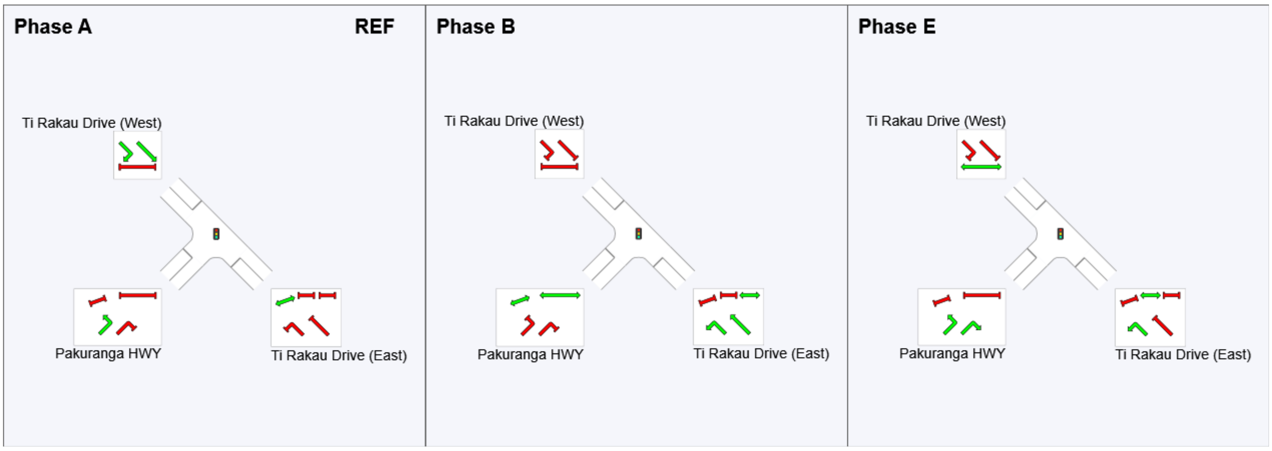
**Timings based on settings in the Site Phasing & Timing dialog**
**Phase Times determined by the program**
**Downstream lane blockage effects included in determining phase times**
**Phase Sequence: Map Extract Default**
**Reference Phase: Phase A**
**Input Phase Sequence: A, B, E**
**Output Phase Sequence: A, B, E**

### Phase Timing Summary

| Phase | A | B | E |
|---|---|---|---|
| Phase Change Time (sec) | 0 | 14 | 28 |
| Green Time (sec) | 8 | 8 | 6 |
| Phase Time (sec) | 14 | 14 | 12 |
| Phase Split | 35% | 35% | 30% |

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

### Output Phase Sequence




REF: Reference Phase
VAR: Variable Phase

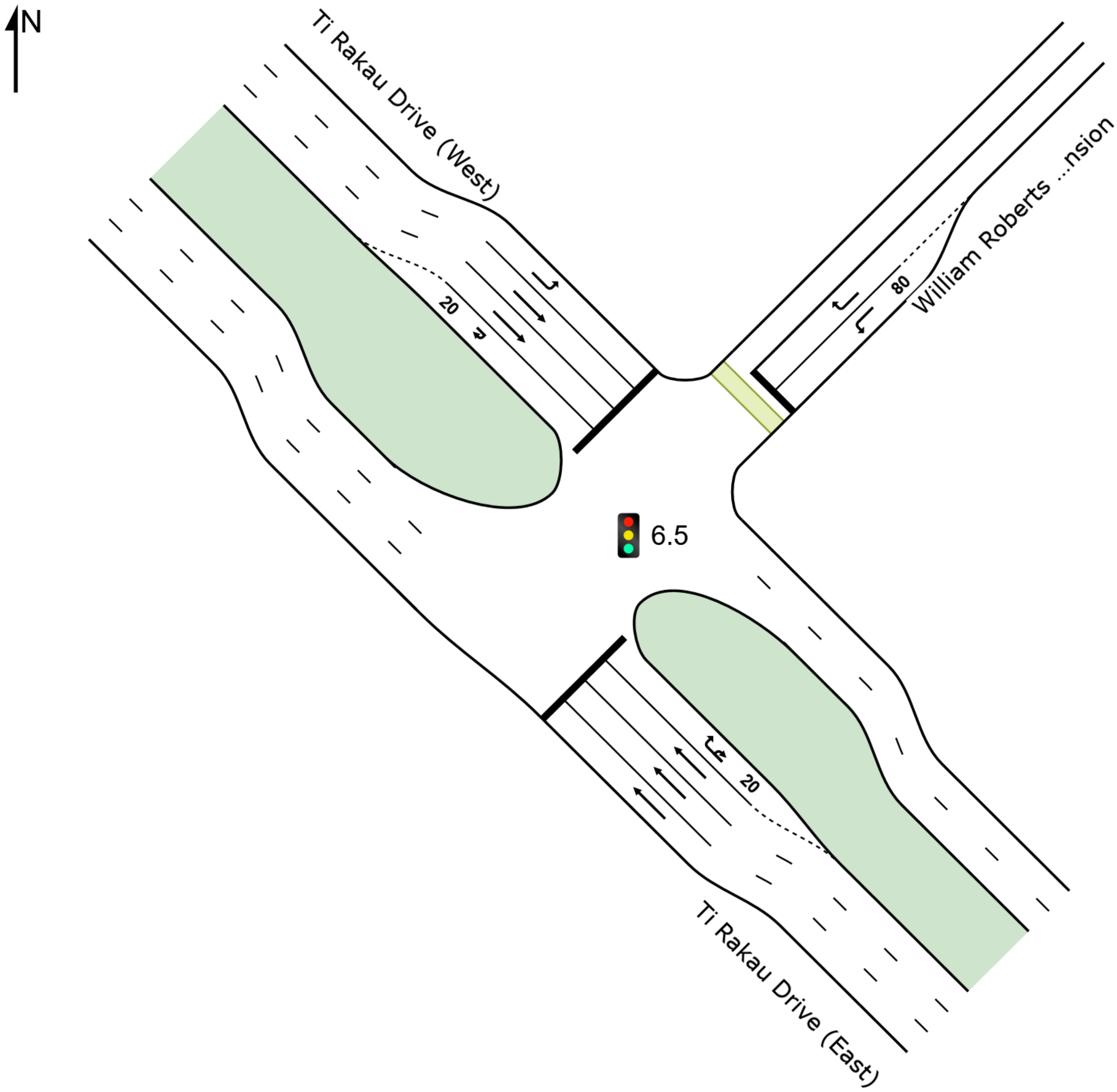
| | |
|---|---|
| Normal Movement | Permitted/Opposed |
| Slip/Bypass-Lane Movement | Opposed Slip/Bypass-Lane |
| Stopped Movement | Turn On Red |
| Other Movement Class (MC) Running | Undetected Movement |
| Mixed Running & Stopped MCs | Continuous Movement |
| Other Movement Class (MC) Stopped | Phase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

# SITE LAYOUT

## Site: 6.5 [6.5 William Roberts Rd / Ti Rakau Dr C (Site Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated

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

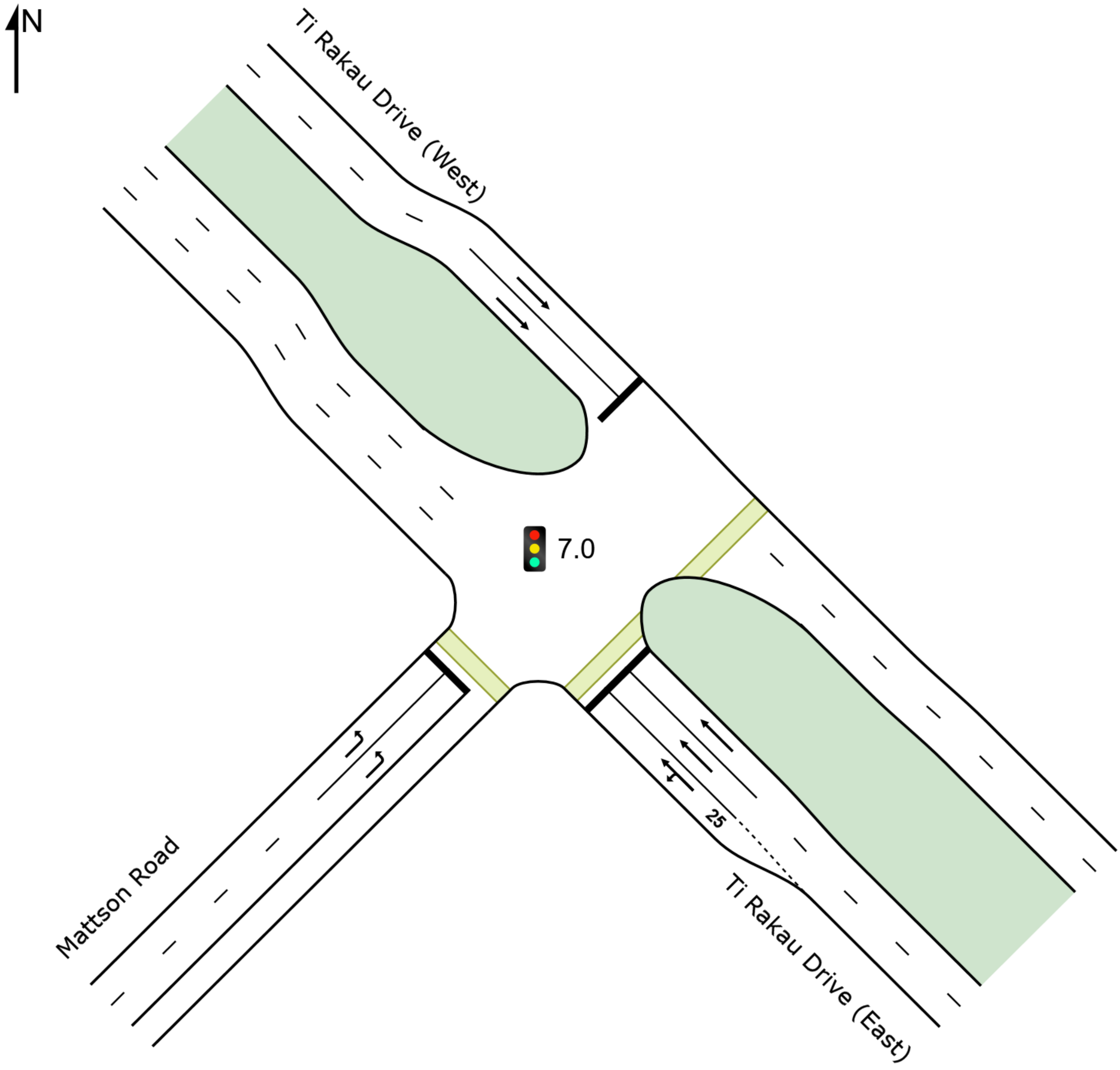


# SITE LAYOUT

## Site: 7.0 [7.0 Mattson Rd/ Ti Rakau Dr C (Site Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated

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



# CCG PHASING SUMMARY

## Common Control Group: CCG1 [WR/ Mattson]

Network: N101 [Construction 1 (Network Folder: AM)]

EQUISAT (Fixed-Time/SCATS) Isolated    Cycle Time = 131 seconds (CCG User-Given Phase Times)

**Timings based on settings in the Network Timing dialog**
**Phase Times specified by the user**
**Phase Sequence: CCG Phasing**
**Reference Phase: Phase A**
**Input Phase Sequence: A, A2, B, B2, C**
**Output Phase Sequence: A, A2, B, B2, C**

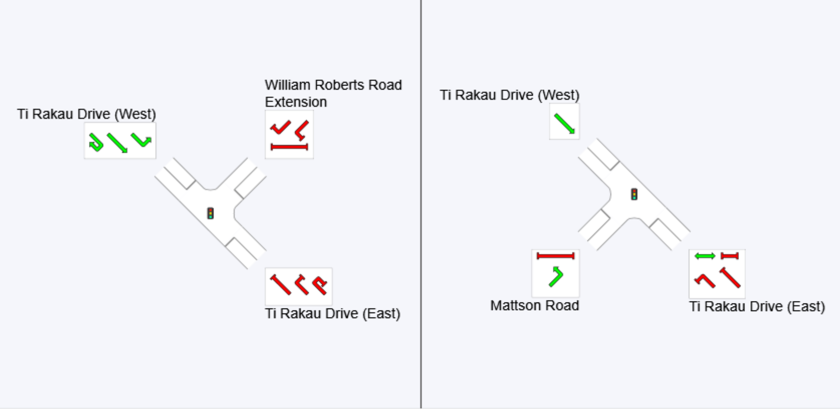
### Phase Timing Summary (CCG)

| Phase | **A** | **A2** | **B** | **B2** | **C** |
|---|---|---|---|---|---|
| Phase Change Time (sec) | 0 | 18 | 43 | 82 | 101 |
| Green Time (sec) | 12 | 19 | 33 | 13 | 24 |
| Phase Time (sec) | 18 | 25 | 39 | 19 | 30 |
| Phase Split | 14% | 19% | 30% | 15% | 23% |

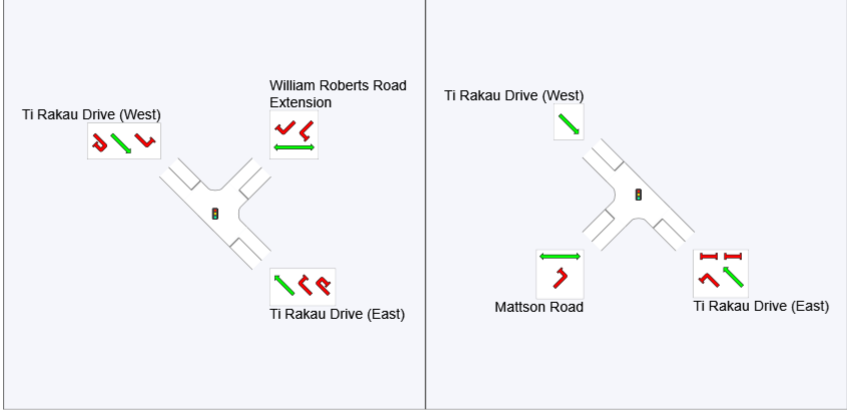
See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified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

### Output Phase Sequence (CCG)

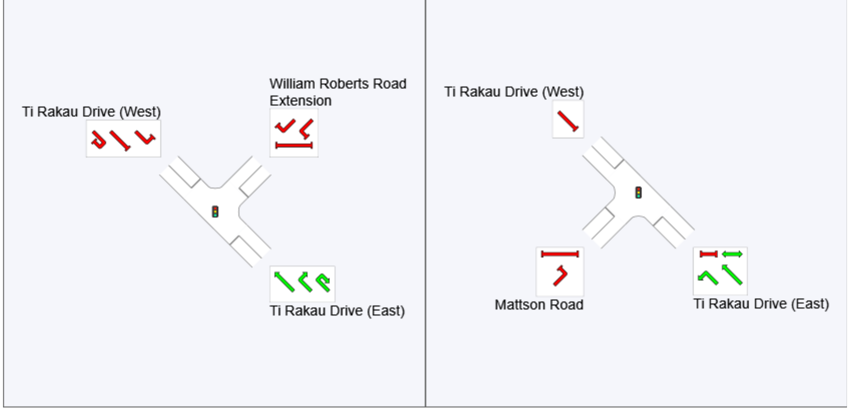
**Phase A** **REF**



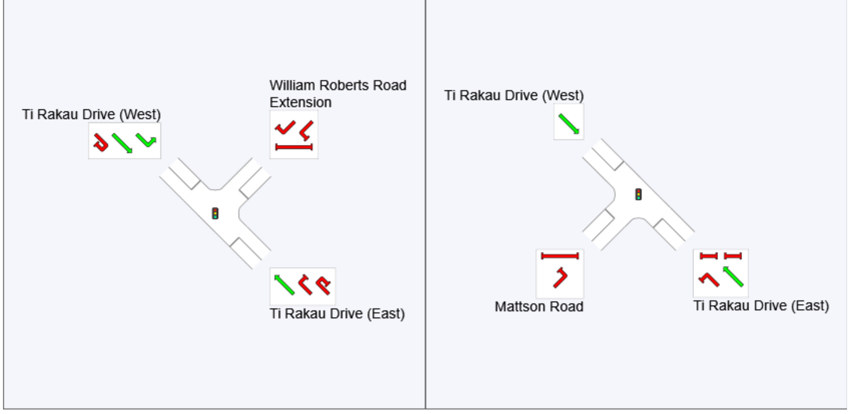

**Phase A2**



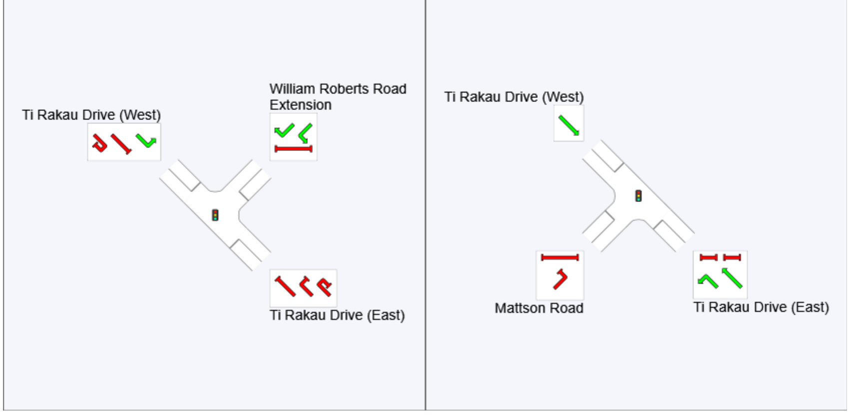
## Phase B



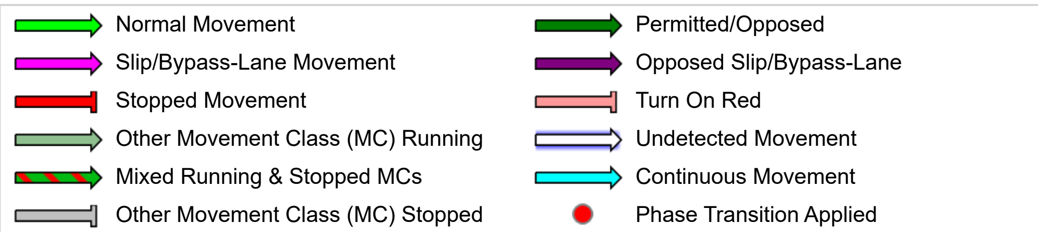

## Phase B2




## Phase C




REF: Reference Phase
VAR: Variable Phase



# CCG PHASING SUMMARY

## Common Control Group: CCG1 [WR/ Mattson]

## Network: N101 [Construction 1 (Network Folder: PM)]

EQUISAT (Fixed-Time/SCATS) Isolated     Cycle Time = 150 seconds (CCG User-Given Phase Times)

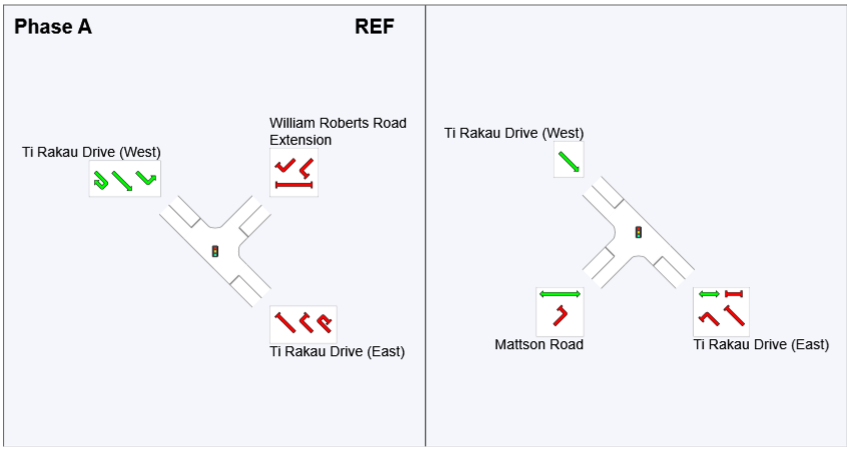
**Timings based on settings in the Network Timing dialog**
**Phase Times specified by the user**
**Phase Sequence: CCG Phasing**
**Reference Phase: Phase A**
**Input Phase Sequence: A, A2, B, B2, C**
**Output Phase Sequence: A, A2, B, B2, C**

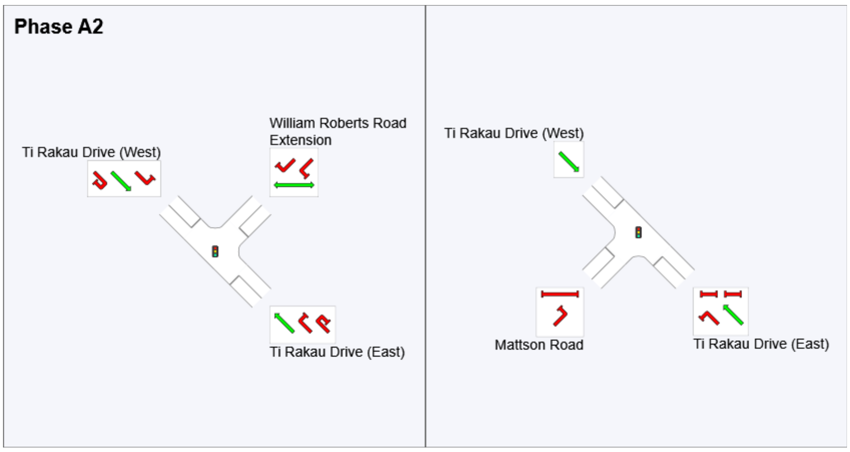
## Phase Timing Summary (CCG)

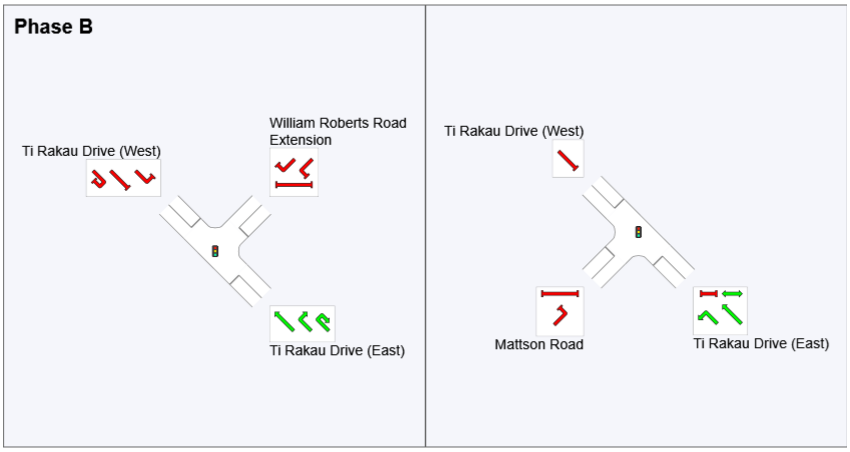
| Phase | A | A2 | B | B2 | C |
|---|---|---|---|---|---|
| Phase Change Time (sec) | 0 | 46 | 70 | 95 | 118 |
| Green Time (sec) | 40 | 18 | 19 | 17 | 26 |
| Phase Time (sec) | 46 | 24 | 25 | 23 | 32 |
| Phase Split | 31% | 16% | 17% | 15% | 21% |

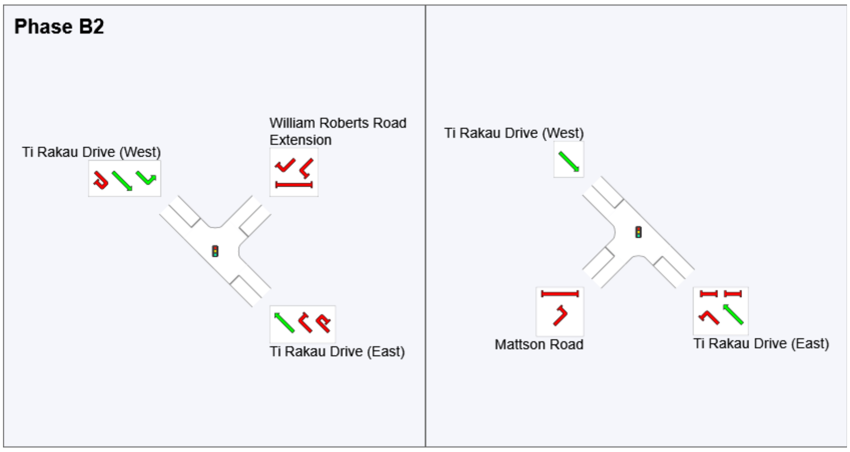
See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified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

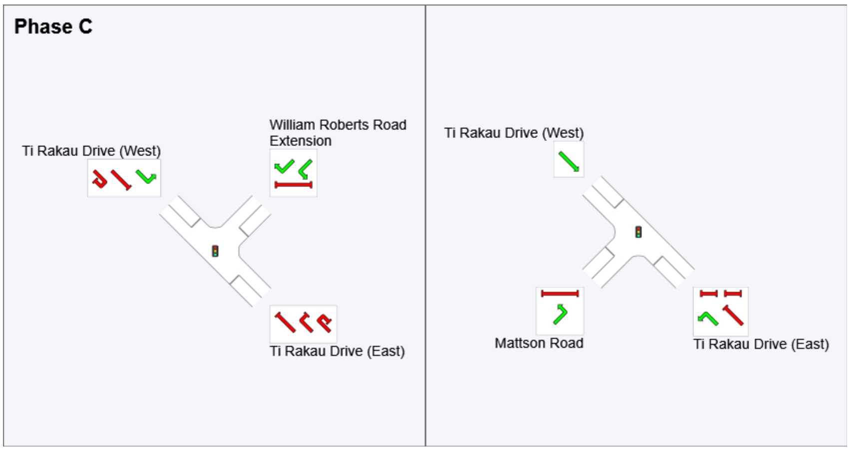
## Output Phase Sequence (CCG)



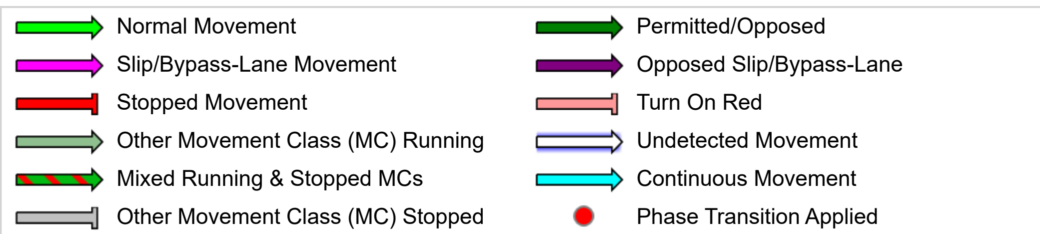






REF: Reference Phase
VAR: Variable Phase

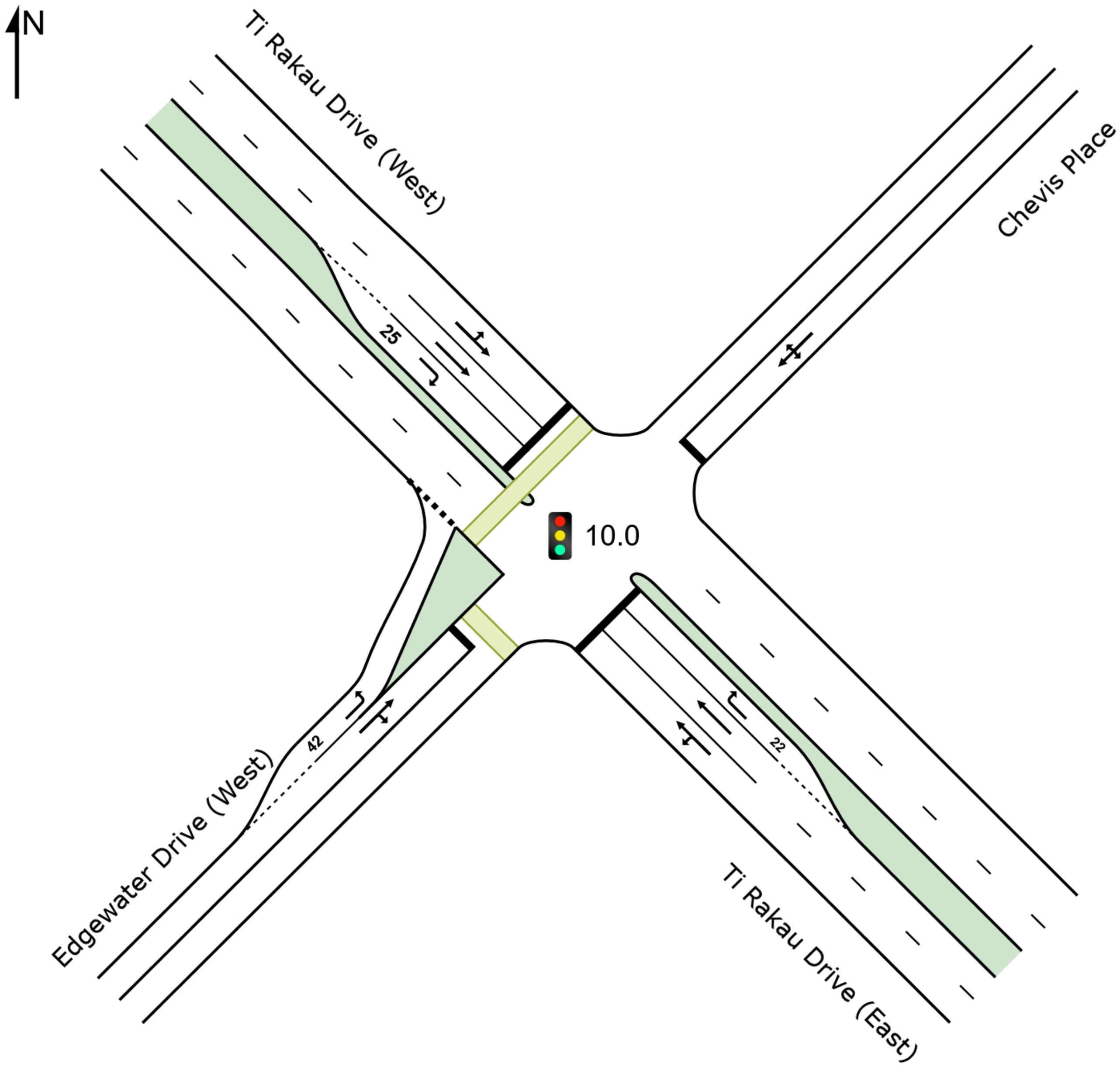


# SITE LAYOUT

## Site: 10.0 [10.0 Edgewater Dr (West) / Chevis Pl (Site Folder: General)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated

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



# PHASING SUMMARY

## Site: 10.0 [10.0 Edgewater Dr (West) / Chevis Pl (Site Folder: General)]

## Network: N101 [Construction 1 (Network Folder: AM)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated     Cycle Time = 90 seconds (Site Practical Cycle Time)

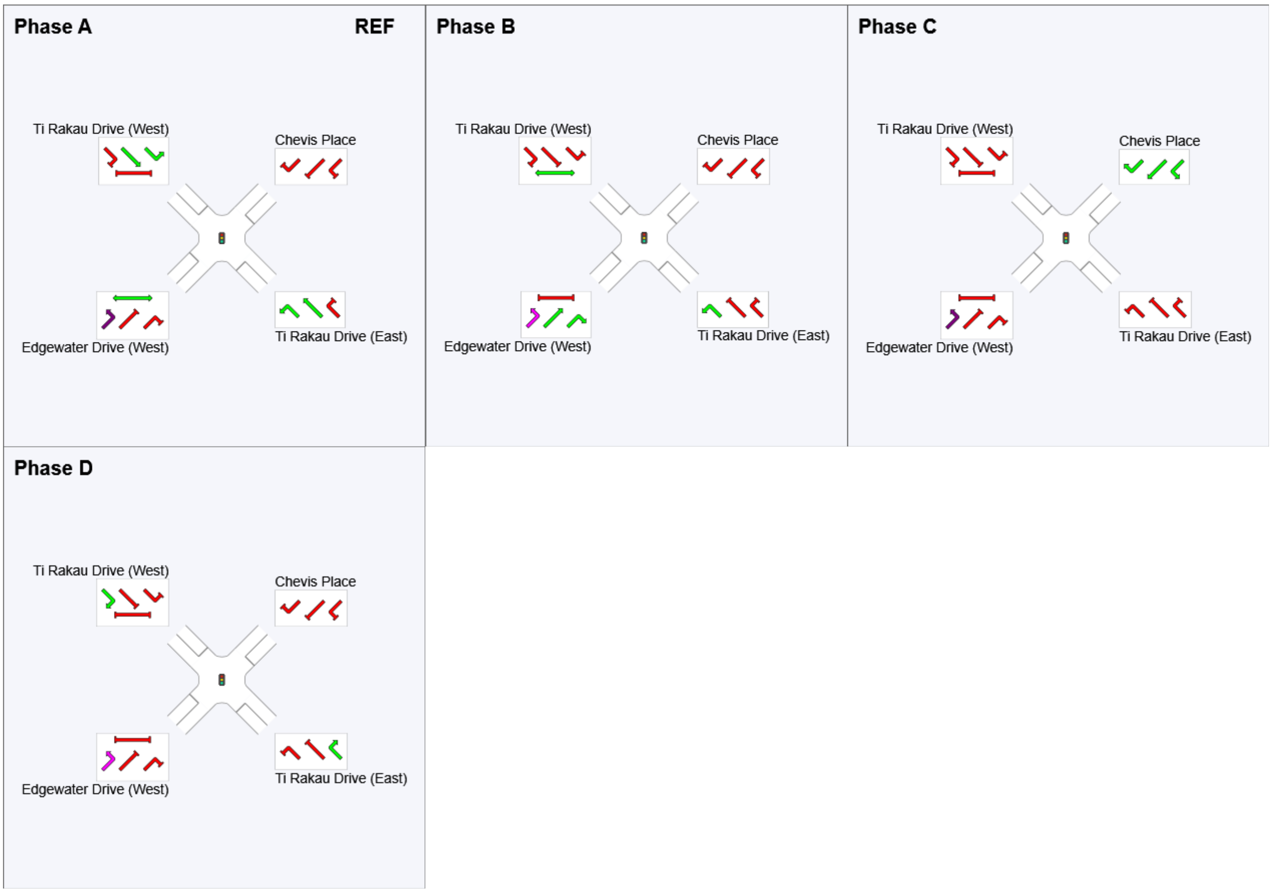
**Timings based on settings in the Site Phasing & Timing dialog**
**Phase Times determined by the program**
**Downstream lane blockage effects included in determining phase times**
**Phase Sequence: Variable Phasing**
**Reference Phase: Phase A**
**Input Phase Sequence: A, B, C, D**
**Output Phase Sequence: A, B, C, D**

### Phase Timing Summary

| Phase | A | B | C | D |
|---|---|---|---|---|
| Phase Change Time (sec) | 0 | 46 | 66 | 78 |
| Green Time (sec) | 40 | 14 | 6 | 6 |
| Phase Time (sec) | 46 | 20 | 12 | 12 |
| Phase Split | 51% | 22% | 13% | 13% |

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

### Output Phase Sequence




REF: Reference Phase
VAR: Variable Phase

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

# PHASING SUMMARY

## Site: 10.0 [10.0 Edgewater Dr (West) / Chevis Pl (Site Folder: General)]

## Network: N101 [Construction 1 (Network Folder: PM)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated    Cycle Time = 100 seconds (Site Practical Cycle Time)

**Timings based on settings in the Site Phasing & Timing dialog**
**Phase Times determined by the program**
**Downstream lane blockage effects included in determining phase times**
**Phase Sequence: Variable Phasing**
**Reference Phase: Phase A**
**Input Phase Sequence: A, B, C, D**
**Output Phase Sequence: A, B, C, D**

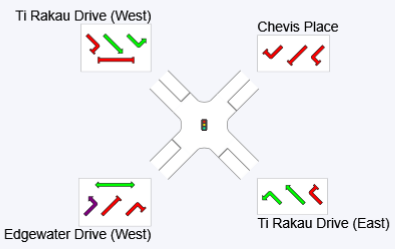
### Phase Timing Summary

| Phase | A | B | C | D |
|---|---|---|---|---|
| Phase Change Time (sec) | 0 | 55 | 76 | 88 |
| Green Time (sec) | 49 | 15 | 6 | 6 |
| Phase Time (sec) | 55 | 21 | 12 | 12 |
| Phase Split | 55% | 21% | 12% | 12% |

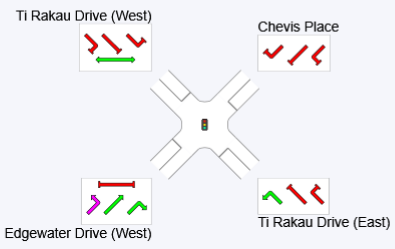
See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified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

### Output Phase Sequence

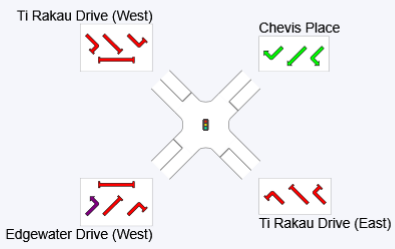
**Phase A** **REF**



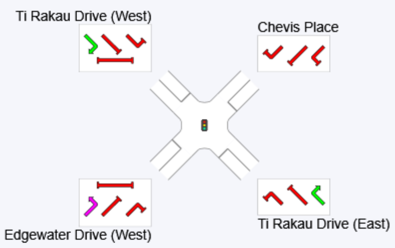

**Phase B**




**Phase C**




**Phase D**




REF: Reference Phase
VAR: Variable Phase

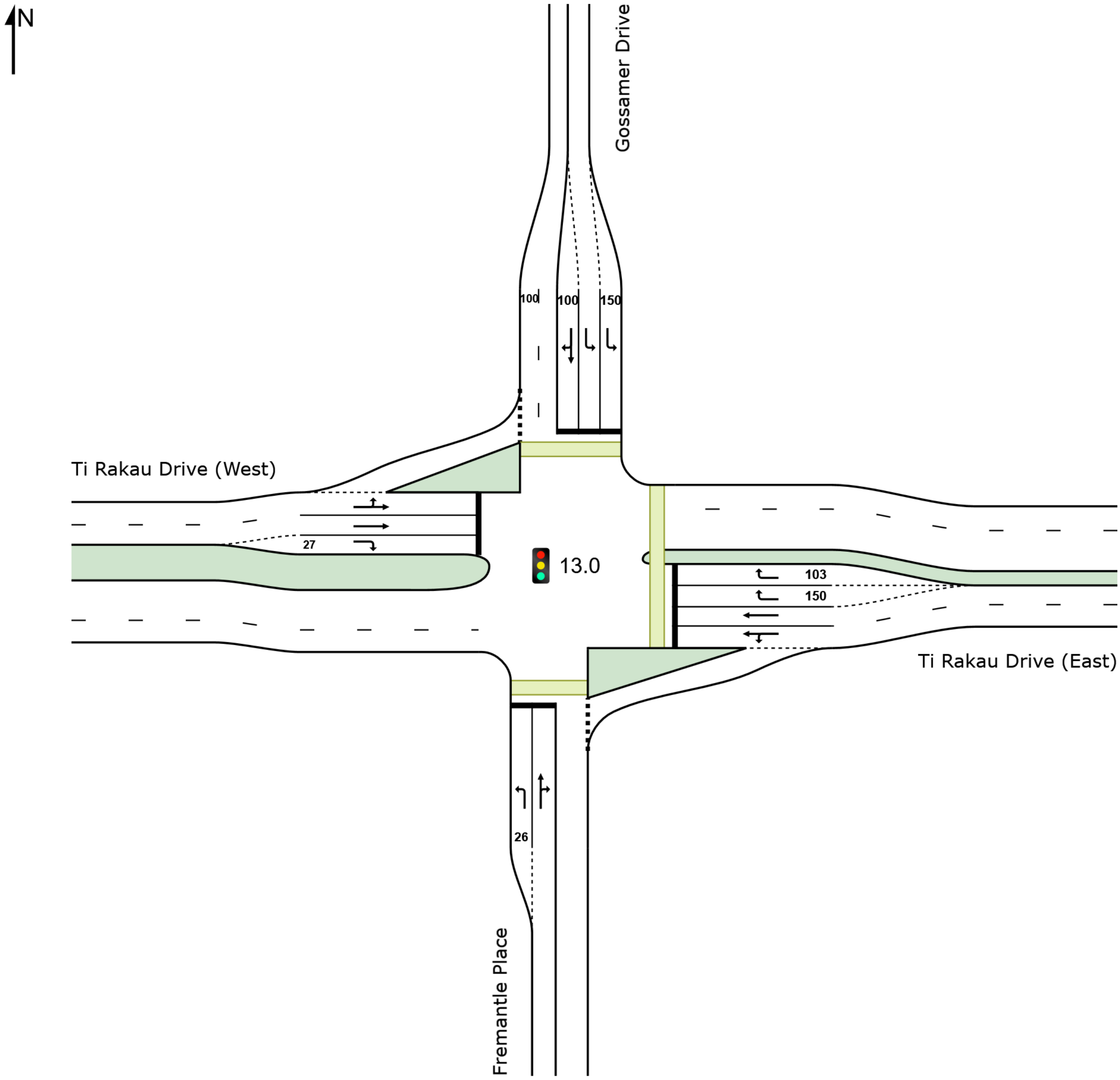
| | |
|---|---|
| Normal Movement | Permitted/Opposed |
| Slip/Bypass-Lane Movement | Opposed Slip/Bypass-Lane |
| Stopped Movement | Turn On Red |
| Other Movement Class (MC) Running | Undetected Movement |
| Mixed Running & Stopped MCs | Continuous Movement |
| Other Movement Class (MC) Stopped | Phase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

# SITE LAYOUT

## Site: 13.0 [13.0 Gossamer Dr / Ti Rakau Dr Mitigation 2 (Site Folder: General)]

Scheme Design
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated

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



# PHASING SUMMARY

## Site: 13.0 [13.0 Gossamer Dr / Ti Rakau Dr Mitigation 2 (Site Folder: General)]

## Network: N101 [Construction 1 (Network Folder: AM)]

Scheme Design
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated     Cycle Time = 110 seconds (Site Practical Cycle Time)

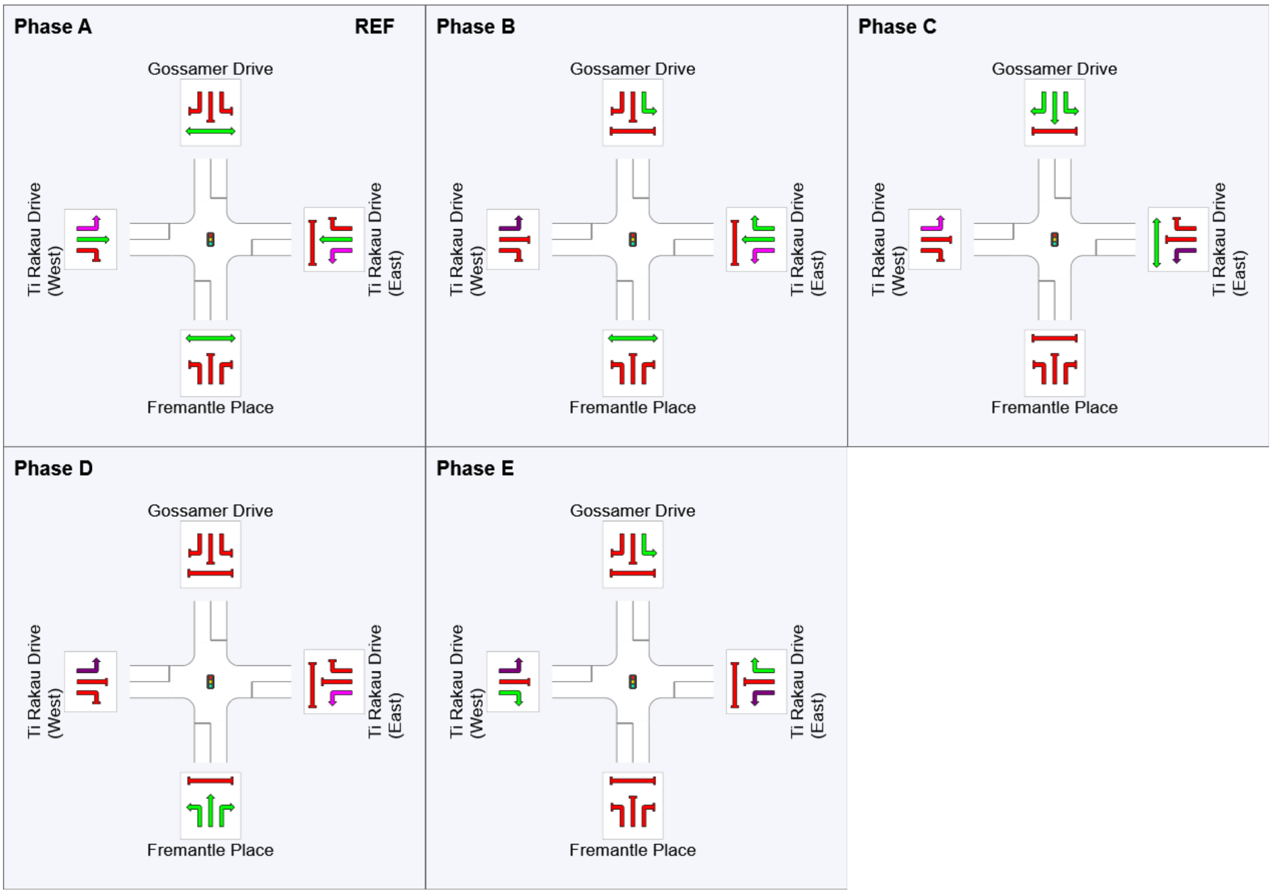
**Timings based on settings in the Site Phasing & Timing dialog**
**Phase Times determined by the program**
**Downstream lane blockage effects included in determining phase times**
**Green Split Priority has been specified**
**Phase Sequence: Variable Phasing**
**Reference Phase: Phase A**
**Input Phase Sequence: A, B, C, D, E**
**Output Phase Sequence: A, B, C, D, E**

### Phase Timing Summary

| Phase | A | B | C | D | E |
|---|---|---|---|---|---|
| Phase Change Time (sec) | 0 | 39 | 56 | 81 | 93 |
| Green Time (sec) | 33 | 11 | 19 | 6 | 11 |
| Phase Time (sec) | 39 | 17 | 25 | 12 | 17 |
| Phase Split | 35% | 15% | 23% | 11% | 15% |

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

### Output Phase Sequence




REF: Reference Phase
VAR: Variable Phase

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

# PHASING SUMMARY

## Site: 13.0 [13.0 Gossamer Dr / Ti Rakau Dr Mitigation 2 (Site Folder: General)]

## Network: N101 [Construction 1 (Network Folder: PM)]

Scheme Design
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated    Cycle Time = 154 seconds (Site User-Given Phase Times)

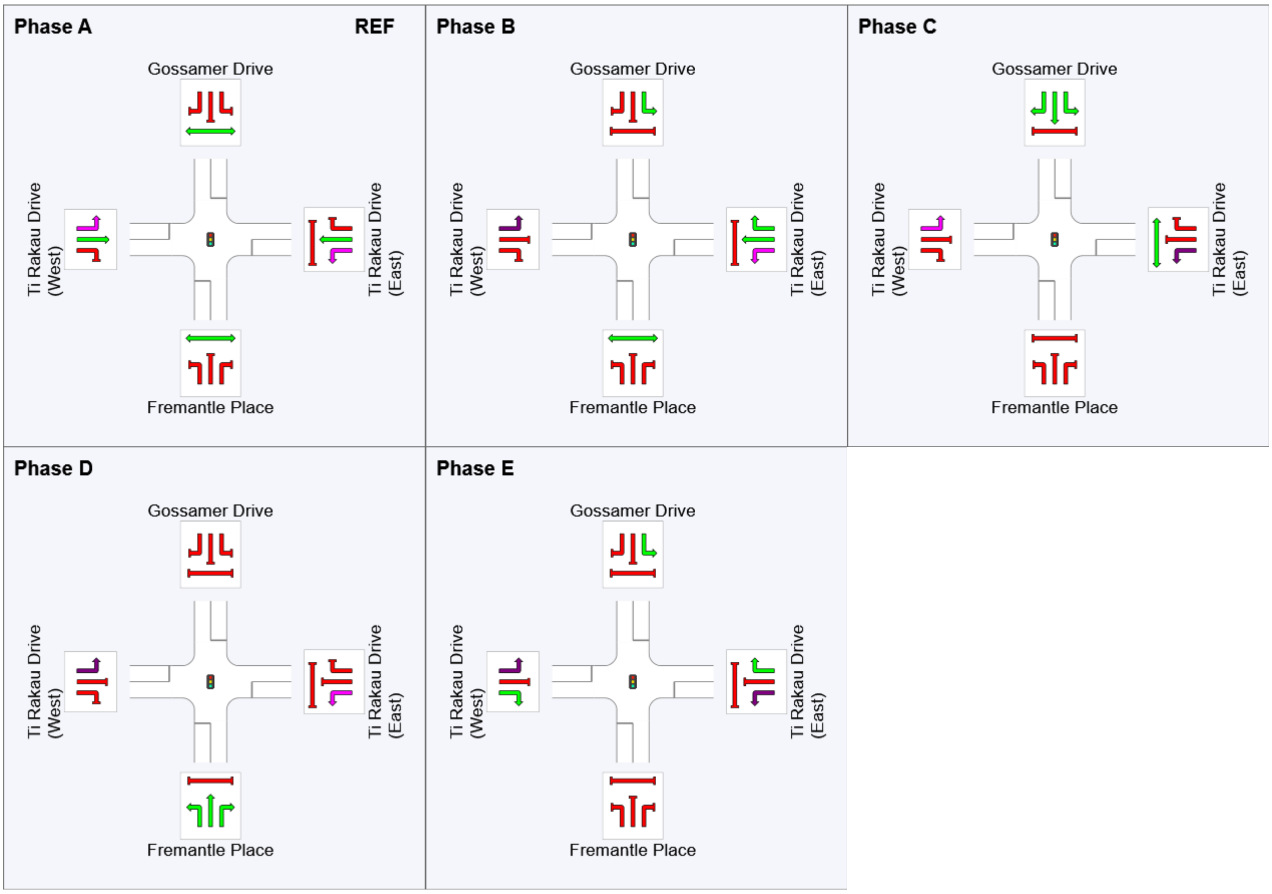
**Timings based on settings in the Site Phasing & Timing dialog**
**Phase Times specified by the user**
**Phase Sequence: Variable Phasing**
**Reference Phase: Phase A**
**Input Phase Sequence: A, B, C, D, E**
**Output Phase Sequence: A, B, C, D, E**

## Phase Timing Summary

| Phase | A | B | C | D | E |
|---|---|---|---|---|---|
| Phase Change Time (sec) | 0 | 50 | 90 | 119 | 134 |
| Green Time (sec) | 44 | 34 | 23 | 10 | 14 |
| Phase Time (sec) | 50 | 40 | 28 | 16 | 20 |
| Phase Split | 32% | 26% | 18% | 10% | 13% |

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

## Output Phase Sequence




REF: Reference Phase
VAR: Variable Phase

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

# Appendix E

**Construction Scenario 1 – Lane performance Summaries**

# LANE SUMMARY

## Site: 1.0 [1.0 Pakuranga Rd / Ti Rakau Rd (Site Folder: General)]

## Network: N101 [Construction 1 (Network Folder: AM)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated    Cycle Time = 130 seconds (Site Practical Cycle Time)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total | HV ] | ARRIVAL FLOWS [ Total | HV ] | Cap. | Deg. Satn | Lane Util. | Aver. Delay | Level of Service | 95% BACK OF QUEUE [ Veh | Dist ] | Lane Config | Lane Length | Cap. Adj. | Prob. Block. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | veh/h | % | veh/h | % | veh/h | v/c | % | sec | | | m | | m | % | % |
| **South: Ti Rakau Drive** | | | | | | | | | | | | | | | |
| Lane 1 | 618 | 9.4 | 574 | 9.4 | 878[1] | 0.655 | 100 | 13.3 | LOS B | 19.4 | 146.7 | Full | 130 | 0.0 | 15.9 |
| Lane 2 (B) | 17 | 100.0 | 17 | 100.0 | 78 | 0.218 | 100 | 73.9 | LOS E | 1.1 | 14.4 | Short | 16 | 0.0 | NA |
| Lane 3 | 221 | 3.6 | 205 | 3.6 | 319 | 0.644 | 100 | 59.0 | LOS E | 12.3 | 88.7 | Full | 130 | 0.0 | 0.0 |
| Lane 4 | 199 | 3.6 | 185 | 3.6 | 288[1] | 0.644 | 100 | 58.3 | LOS E | 11.0 | 79.0 | Full | 130 | 0.0 | 0.0 |
| Lane 5 | 199 | 3.6 | 185 | 3.6 | 288[1] | 0.644 | 100 | 58.3 | LOS E | 11.0 | 79.0 | Short | 40 | 0.0 | NA |
| Approach | 1254 | 7.7 | 1167[N1] | 7.8 | | 0.655 | | 36.5 | LOS D | 19.4 | 146.7 | | | | |
| **East: Pakuranga Road (East)** | | | | | | | | | | | | | | | |
| Lane 1 | 1114 | 5.0 | 1100 | 5.0 | 1221 | 0.900 | 100 | 30.9 | LOS C | 25.3[N4] | 184.4[N4] | Full | 113 | 0.0 | 50.0 |
| Lane 2 | 552 | 6.0 | 545 | 6.0 | 862 | 0.632 | 100 | 28.3 | LOS C | 25.1[N4] | 184.4[N4] | Full | 113 | 0.0 | 50.0 |
| Lane 3 | 530 | 6.0 | 523 | 6.0 | 828[1] | 0.632 | 100 | 27.8 | LOS C | 24.5 | 180.5 | Full | 113 | 0.0 | 48.0 |
| Lane 4 (B) | 25 | 100.0 | 25 | 100.0 | 73 | 0.340 | 100 | 69.7 | LOS E | 1.6 | 21.4 | Short | 101 | 0.0 | NA |
| Approach | 2221 | 6.6 | 2193[N1] | 6.5 | | 0.900 | | 30.0 | LOS C | 25.3 | 184.4 | | | | |
| **West: Pakuranga Road (West)** | | | | | | | | | | | | | | | |
| Lane 1 (B) | 24 | 100.0 | 24 | 100.0 | 52 | 0.460 | 100 | 72.1 | LOS E | 1.6 | 20.9 | Full | 388 | 0.0 | 0.0 |
| Lane 2 | 259 | 8.1 | 259 | 8.1 | 978 | 0.264 | 100 | 17.6 | LOS B | 8.8 | 65.7 | Short | 141 | 0.0 | NA |
| Lane 3 | 259 | 8.1 | 259 | 8.1 | 978 | 0.264 | 100 | 17.6 | LOS B | 8.8 | 65.7 | Full | 388 | 0.0 | 0.0 |
| Lane 4 | 259 | 8.1 | 259 | 8.1 | 978 | 0.264 | 100 | 17.6 | LOS B | 8.8 | 65.7 | Full | 388 | 0.0 | 0.0 |
| Lane 5 | 192 | 15.9 | 192 | 15.9 | 217 | 0.885 | 100 | 78.6 | LOS E | 13.8 | 109.9 | Short | 178 | 0.0 | NA |
| Lane 6 | 192 | 15.9 | 192 | 15.9 | 217 | 0.885 | 100 | 78.6 | LOS E | 13.8 | 109.9 | Short | 105 | 0.0 | NA |
| Approach | 1184 | 12.5 | 1184 | 12.5 | | 0.885 | | 38.5 | LOS D | 13.8 | 109.9 | | | | |
| Intersection | 4659 | 8.4 | 4543[N1] | 8.6 | | 0.900 | | 33.9 | LOS C | 25.3 | 184.4 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.
N4 Average back of queue has been restricted to the available queue storage space.

**Approach Lane Flows (veh/h)**

South: Ti Rakau Drive

| Mov. From S To Exit: | L2 W | R2 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 574 | - | 574 | 9.4 | 878[1] | 0.655 | 100 | NA | NA |
| Lane 2 | 17 | - | 17 | 100.0 | 78 | 0.218 | 100 | 0.0 | 1 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 3 | - | 205 | 205 | 3.6 | 319 | 0.644 | 100 | NA | NA |
| Lane 4 | - | 185 | 185 | 3.6 | 288[1] | 0.644 | 100 | NA | NA |
| Lane 5 | - | 185 | 185 | 3.6 | 288[1] | 0.644 | 100 | 68.2 | 4 |
| Approach | 591 | 575 | 1167 | 7.8 | | 0.655 | | | |

East: Pakuranga Road (East)

| Mov. From E To Exit: | L2 S | T1 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 1100 | - | 1100 | 5.0 | 1221 | 0.900 | 100 | NA | NA |
| Lane 2 | - | 545 | 545 | 6.0 | 862 | 0.632 | 100 | NA | NA |
| Lane 3 | - | 523 | 523 | 6.0 | 828[1] | 0.632 | 100 | NA | NA |
| Lane 4 | - | 25 | 25 | 100.0 | 73 | 0.340 | 100 | 0.0 | 3 |
| Approach | 1100 | 1093 | 2193 | 6.5 | | 0.900 | | | |

West: Pakuranga Road (West)

| Mov. From W To Exit: | T1 E | R2 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 9 | 15 | 24 | 100.0 | 52 | 0.460 | 100 | NA | NA |
| Lane 2 | 259 | - | 259 | 8.1 | 978 | 0.264 | 100 | 0.0 | 3 |
| Lane 3 | 259 | - | 259 | 8.1 | 978 | 0.264 | 100 | NA | NA |
| Lane 4 | 259 | - | 259 | 8.1 | 978 | 0.264 | 100 | NA | NA |
| Lane 5 | - | 192 | 192 | 15.9 | 217 | 0.885 | 100 | 0.0 | 4 |
| Lane 6 | - | 192 | 192 | 15.9 | 217 | 0.885 | 100 | 9.1 | 5 |
| Approach | 785 | 399 | 1184 | 12.5 | | 0.885 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 4543 | 8.6 | 0.900 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

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

## Merge Analysis

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **South Exit: Ti Rakau Drive**<br>Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | |
| **East Exit: Pakuranga Road (East)**<br>Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | |
| **West Exit: Pakuranga Road (West)**<br>Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | |

# LANE SUMMARY

## Site: 1.0 [1.0 Pakuranga Rd / Ti Rakau Rd (Site Folder: General)]

## Network: N101 [Construction 1 (Network Folder: PM)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated    Cycle Time = 70 seconds (Site Practical Cycle Time)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total | HV ] | ARRIVAL FLOWS [ Total | HV ] | Cap. | Deg. Satn | Lane Util. | Aver. Delay | Level of Service | 95% BACK OF QUEUE [ Veh | Dist ] | Lane Config | Lane Length | Cap. Adj. | Prob. Block. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | veh/h | % | veh/h | % | veh/h | v/c | % | sec | | | m | | m | % | % |
| **South: Ti Rakau Drive** | | | | | | | | | | | | | | | |
| Lane 1 | 624 | 6.4 | 592 | 6.4 | 1121 [1] | 0.528 | 100 | 7.8 | LOS A | 7.2 | 53.3 | Full | 130 | 0.0 | 0.0 |
| Lane 2 (B) | 13 | 100.0 | 13 | 100.0 | 145 | 0.090 | 100 | 39.0 | LOS D | 0.4 | 5.7 | Short | 16 | 0.0 | NA |
| Lane 3 | 362 | 6.7 | 343 | 6.7 | 403 | 0.852 | 100 | 40.7 | LOS D | 13.4 | 99.5 | Full | 130 | 0.0 | 0.0 |
| Lane 4 | 333 | 6.7 | 316 | 6.7 | 371 [1] | 0.852 | 100 | 40.5 | LOS D | 12.3 | 90.7 | Full | 130 | 0.0 | 0.0 |
| Lane 5 | 333 | 6.7 | 316 | 6.7 | 371 [1] | 0.852 | 100 | 40.5 | LOS D | 12.3 | 90.7 | Short | 40 | 0.0 | NA |
| Approach | 1665 | 7.3 | 1581 [N1] | 7.4 | | 0.852 | | 28.3 | LOS C | 13.4 | 99.5 | | | | |
| **East: Pakuranga Road (East)** | | | | | | | | | | | | | | | |
| Lane 1 | 448 | 2.2 | 438 | 2.2 | 1013 | 0.432 | 100 | 15.4 | LOS B | 8.7 | 62.3 | Full | 113 | 0.0 | 0.0 |
| Lane 2 | 385 | 8.2 | 376 | 8.2 | 447 | 0.841 | 100 | 34.3 | LOS C | 14.4 | 107.8 | Full | 113 | 0.0 | 0.7 |
| Lane 3 | 385 | 8.2 | 376 | 8.2 | 447 | 0.841 | 100 | 34.3 | LOS C | 14.4 | 107.8 | Full | 113 | 0.0 | 0.7 |
| Lane 4 (B) | 11 | 100.0 | 11 | 100.0 | 102 | 0.107 | 100 | 36.2 | LOS D | 0.4 | 4.9 | Short | 101 | 0.0 | NA |
| Approach | 1229 | 6.8 | 1201 [N1] | 6.9 | | 0.841 | | 27.4 | LOS C | 14.4 | 107.8 | | | | |
| **West: Pakuranga Road (West)** | | | | | | | | | | | | | | | |
| Lane 1 (B) | 42 | 100.0 | 42 | 100.0 | 98 | 0.429 | 100 | 35.8 | LOS D | 1.4 | 18.7 | Full | 388 | 0.0 | 0.0 |
| Lane 2 | 419 | 8.0 | 419 | 8.0 | 474 | 0.883 | 100 | 38.0 | LOS D | 17.2 | 128.6 | Short | 141 | 0.0 | NA |
| Lane 3 | 419 | 8.0 | 419 | 8.0 | 474 | 0.883 | 100 | 38.0 | LOS D | 17.2 | 128.6 | Full | 388 | 0.0 | 0.0 |
| Lane 4 | 419 | 8.0 | 419 | 8.0 | 474 | 0.883 | 100 | 38.0 | LOS D | 17.2 | 128.6 | Full | 388 | 0.0 | 0.0 |
| Lane 5 | 157 | 3.5 | 157 | 3.5 | 180 | 0.871 | 100 | 48.3 | LOS D | 6.4 | 45.9 | Short | 178 | 0.0 | NA |
| Lane 6 | 157 | 3.5 | 157 | 3.5 | 180 | 0.871 | 100 | 48.3 | LOS D | 6.4 | 45.9 | Short | 105 | 0.0 | NA |
| Approach | 1613 | 9.5 | 1613 | 9.5 | | 0.883 | | 40.0 | LOS D | 17.2 | 128.6 | | | | |
| Intersection | 4507 | 8.0 | 4396 [N1] | 8.2 | | 0.883 | | 32.3 | LOS C | 17.2 | 128.6 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

**Approach Lane Flows (veh/h)**

South: Ti Rakau Drive

| Mov. From S To Exit: | L2 W | R2 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 592 | - | 592 | 6.4 | 1121 [1] | 0.528 | 100 | NA | NA |
| Lane 2 | 13 | - | 13 | 100.0 | 145 | 0.090 | 100 | 0.0 | 1 |
| Lane 3 | - | 343 | 343 | 6.7 | 403 | 0.852 | 100 | NA | NA |

| Mov. | | | | | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 4 | - | 316 | 316 | 6.7 | 371[1] | 0.852 | 100 | NA | NA |
| Lane 5 | - | 316 | 316 | 6.7 | 371[1] | 0.852 | 100 | 81.5 | 4 |
| Approach | 605 | 976 | 1581 | 7.4 | | 0.852 | | | |

East: Pakuranga Road (East)

| Mov. From E To Exit: | L2 S | T1 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 438 | - | 438 | 2.2 | 1013 | 0.432 | 100 | NA | NA |
| Lane 2 | - | 376 | 376 | 8.2 | 447 | 0.841 | 100 | NA | NA |
| Lane 3 | - | 376 | 376 | 8.2 | 447 | 0.841 | 100 | NA | NA |
| Lane 4 | - | 11 | 11 | 100.0 | 102 | 0.107 | 100 | 0.0 | 3 |
| Approach | 438 | 763 | 1201 | 6.9 | | 0.841 | | | |

West: Pakuranga Road (West)

| Mov. From W To Exit: | T1 E | R2 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 21 | 21 | 42 | 100.0 | 98 | 0.429 | 100 | NA | NA |
| Lane 2 | 419 | - | 419 | 8.0 | 474 | 0.883 | 100 | 0.0 | 3 |
| Lane 3 | 419 | - | 419 | 8.0 | 474 | 0.883 | 100 | NA | NA |
| Lane 4 | 419 | - | 419 | 8.0 | 474 | 0.883 | 100 | NA | NA |
| Lane 5 | - | 157 | 157 | 3.5 | 180 | 0.871 | 100 | 0.0 | 4 |
| Lane 6 | - | 157 | 157 | 3.5 | 180 | 0.871 | 100 | 0.0 | 5 |
| Approach | 1278 | 335 | 1613 | 9.5 | | 0.883 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 4396 | 8.2 | 0.883 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

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

## Merge Analysis

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South Exit: Ti Rakau Drive<br>Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | |
| East Exit: Pakuranga Road (East)<br>Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | |
| West Exit: Pakuranga Road (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | |

# LANE SUMMARY

## Site: 1.3 [1.3 Mall/ Pakuranga Rd WR Closure (Site Folder: General)]

## Network: N101 [Construction 1 (Network Folder: AM)]

New Site
Site Category: (None)
Give-Way (Two-Way)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total | HV ] | ARRIVAL FLOWS [ Total | HV ] | Cap. | Deg. Satn | Lane Util. | Aver. Delay | Level of Service | 95% BACK OF QUEUE [ Veh | Dist ] | Lane Config | Lane Length | Cap. Adj. | Prob. Block. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | veh/h | % | veh/h | % | veh/h | v/c | % | sec | | | m | | m | % | % |
| **East: Pakuranga Road (East)** | | | | | | | | | | | | | | | |
| Lane 1 | 764 | 8.5 | 764 | 8.5 | 1966 | 0.389 | 100 | 0.6 | LOS A | 9.4[N5] | 70.8[N5] | Full | 152 | 0.0 | 16.0 |
| Lane 2 | 736 | 5.5 | 736 | 5.5 | 1893 | 0.389 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 152 | 0.0 | 0.0 |
| Lane 3 | 736 | 5.5 | 736 | 5.5 | 1893 | 0.389 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 152 | 0.0 | 0.0 |
| Approach | 2237 | 6.5 | 2237 | 6.5 | | 0.389 | | 0.2 | NA | 9.4 | 70.8 | | | | |
| **West: Pakuranga Road (West)** | | | | | | | | | | | | | | | |
| Lane 1 | 183 | 6.8 | 180 | 6.9 | 1798 | 0.100 | 31[6] | 1.4 | LOS A | 0.0 | 0.0 | Full | 108 | 0.0 | 0.0 |
| Lane 2 | 592 | 6.8 | 580 | 6.9 | 1789 | 0.324 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 108 | 0.0 | 0.0 |
| Lane 3 | 608 | 6.8 | 596 | 6.9 | 1837 | 0.324 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 108 | 0.0 | 0.0 |
| Approach | 1384 | 6.8 | 1356[N1] | 6.9 | | 0.324 | | 0.2 | NA | 0.0 | 0.0 | | | | |
| **SouthWest: Pakuranga Plaza** | | | | | | | | | | | | | | | |
| Lane 1 | 25 | 8.0 | 25 | 8.0 | 266 | 0.094 | 100 | 4.9 | LOS A | 0.3[N5] | 2.6[N5] | Full | 196 | -49.9[N7] | 10.8 |
| Approach | 25 | 8.0 | 25 | 8.0 | | 0.094 | | 4.9 | LOS A | 0.3 | 2.6 | | | | |
| Intersection | 3646 | 6.6 | 3618[N1] | 6.7 | | 0.389 | | 0.3 | NA | 9.4 | 70.8 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

6 Lane under-utilisation due to downstream effects
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.
N5 Continuous Lane results determined by Back of Queue values of downstream lanes (proportional to lane movement flows).
N7 The capacity reduction has been determined from the queue blockage probability of a Site further downstream due to intermediate continuous lanes.

**Approach Lane Flows (veh/h)**

East: Pakuranga Road (East)

| Mov. From E To Exit: | L1 SW | T1 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 74 | 690 | 764 | 8.5 | 1966 | 0.389 | 100 | NA | NA |
| Lane 2 | - | 736 | 736 | 5.5 | 1893 | 0.389 | 100 | NA | NA |
| Lane 3 | - | 736 | 736 | 5.5 | 1893 | 0.389 | 100 | NA | NA |
| Approach | 74 | 2163 | 2237 | 6.5 | | 0.389 | | | |

West: Pakuranga Road (West)

| Mov. From W To Exit: | T1 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Lane 1 | 180 | 180 | 6.9 | 1798 | 0.100 | 31[6] | NA | NA |
| Lane 2 | 580 | 580 | 6.9 | 1789 | 0.324 | 100 | NA | NA |
| Lane 3 | 596 | 596 | 6.9 | 1837 | 0.324 | 100 | NA | NA |
| Approach | 1356 | 1356 | 6.9 | | 0.324 | | | |
| **SouthWest: Pakuranga Plaza** | | | | | | | | |
| Mov. From SW To Exit: | L3 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 25 | 25 | 8.0 | 266 | 0.094 | 100 | NA | NA |
| Approach | 25 | 25 | 8.0 | | 0.094 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 3618 | 6.7 | 0.389 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

6 Lane under-utilisation due to downstream effects

## Merge Analysis

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **East Exit: Pakuranga Road (East)**<br>Merge Type: **Priority** | | | | | | | | | | | | |
| Exit Short Lane | 1 | 52 | 0.0 | 580 | 600 | 3.00 | 2.00 | 180 | 1180 | 0.152 | 1.1 | 1.4 |
| Merge Lane | 2 | - | 100.0 | Merge Lane is not Opposed | | | | 580 | 1800 | 0.322 | 0.0 | 0.0 |
| **West Exit: Pakuranga Road (West)**<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | | |
| **SouthWest Exit: Pakuranga Plaza**<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |

# LANE SUMMARY

## Site: 1.3 [1.3 Mall/ Pakuranga Rd WR Closure (Site Folder: General)]

## Network: N101 [Construction 1 (Network Folder: PM)]

New Site
Site Category: (None)
Give-Way (Two-Way)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Pakuranga Road (East) | | | | | | | | | | | | | | | |
| Lane 1 | 439 | 8.0 | 439 | 8.0 | 1973 | 0.222 | 100 | 0.4 | LOS A | 0.0 | 0.0 | Short | 52 | 0.0 | NA |
| Lane 2 | 420 | 5.9 | 420 | 5.9 | 1887 | 0.222 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 152 | 0.0 | 0.0 |
| Lane 3 | 420 | 5.9 | 420 | 5.9 | 1887 | 0.222 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 152 | 0.0 | 0.0 |
| Approach | 1278 | 6.7 | 1278 | 6.7 | | 0.222 | | 0.2 | NA | 0.0 | 0.0 | | | | |
| West: Pakuranga Road (West) | | | | | | | | | | | | | | | |
| Lane 1 | 765 | 8.2 | 754 | 8.3 | 1783 | 0.423 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 108 | 0.0 | 0.0 |
| Lane 2 | 760 | 8.2 | 749 | 8.3 | 1774 | 0.423 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 108 | 0.0 | 0.0 |
| Lane 3 | 781 | 8.2 | 770 | 8.3 | 1822 | 0.423 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 108 | 0.0 | 0.0 |
| Approach | 2306 | 8.2 | 2273 N1 | 8.3 | | 0.423 | | 0.0 | NA | 0.0 | 0.0 | | | | |
| SouthWest: Pakuranga Plaza | | | | | | | | | | | | | | | |
| Lane 1 | 38 | 2.6 | 38 | 2.6 | 849 | 0.045 | 100 | 2.0 | LOS A | 0.2 | 1.1 | Full | 196 | 0.0 | 0.0 |
| Approach | 38 | 2.6 | 38 | 2.6 | | 0.045 | | 2.0 | LOS A | 0.2 | 1.1 | | | | |
| Intersection | 3622 | 7.6 | 3589 N1 | 7.7 | | 0.423 | | 0.1 | NA | 0.2 | 1.1 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

**Approach Lane Flows (veh/h)**

East: Pakuranga Road (East)

| Mov. From E To Exit: | L1 SW | T1 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 33 | 406 | 439 | 8.0 | 1973 | 0.222 | 100 | 0.0 | 2 |
| Lane 2 | - | 420 | 420 | 5.9 | 1887 | 0.222 | 100 | NA | NA |
| Lane 3 | - | 420 | 420 | 5.9 | 1887 | 0.222 | 100 | NA | NA |
| Approach | 33 | 1245 | 1278 | 6.7 | | 0.222 | | | |

West: Pakuranga Road (West)

| Mov. From W To Exit: | T1 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|
| Lane 1 | 754 | 754 | 8.3 | 1783 | 0.423 | 100 | NA | NA |
| Lane 2 | 749 | 749 | 8.3 | 1774 | 0.423 | 100 | NA | NA |
| Lane 3 | 770 | 770 | 8.3 | 1822 | 0.423 | 100 | NA | NA |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Approach | 2273 | 2273 | 8.3 | | 0.423 | | | |
| **SouthWest: Pakuranga Plaza** | | | | | | | | |
| Mov. From SW To Exit: | L3 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 38 | 38 | 2.6 | 849 | 0.045 | 100 | NA | NA |
| Approach | 38 | 38 | 2.6 | | 0.045 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 3589 | 7.7 | 0.423 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

## Merge Analysis

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | Opposing Flow Rate pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **East Exit: Pakuranga Road (East)** Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | | |
| **West Exit: Pakuranga Road (West)** Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | | |
| **SouthWest Exit: Pakuranga Plaza** Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |

# LANE SUMMARY

## Site: 5.3 [5.3 Reeves Rd/ Aylesbury St (Site Folder: General)]

**Network: N101 [Construction 1 (Network Folder: AM)]**

New Site
Site Category: (None)
Give-Way (Two-Way)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Reeves Rd (North) | | | | | | | | | | | | | | | |
| Lane 1 | 32 | 3.1 | 32 | 3.1 | 1969 | 0.016 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 55 | 0.0 | 0.0 |
| Lane 2 | 51 | 5.9 | 51 | 5.9 | 1719 | 0.029 | 100 | 4.4 | LOS A | 0.1 | 1.0 | Short | 53 | 0.0 | NA |
| Approach | 83 | 4.8 | 82 N1 | 4.8 | | 0.029 | | 2.7 | NA | 0.1 | 1.0 | | | | |
| North: Aylesbury St | | | | | | | | | | | | | | | |
| Lane 1 | 20 | 0.0 | 20 | 0.0 | 1296 | 0.015 | 100 | 0.4 | LOS A | 0.1 | 0.4 | Full | 193 | 0.0 | 0.0 |
| Approach | 20 | 0.0 | 20 | 0.0 | | 0.015 | | 0.4 | LOS A | 0.1 | 0.4 | | | | |
| West: Reeves Rd (South) | | | | | | | | | | | | | | | |
| Lane 1 | 20 | 0.0 | 20 | 0.0 | 1991 | 0.010 | 100 | 2.2 | LOS A | 0.0 | 0.0 | Full | 60 | 0.0 | 0.0 |
| Approach | 20 | 0.0 | 20 | 0.0 | | 0.010 | | 2.2 | NA | 0.0 | 0.0 | | | | |
| Intersection | 123 | 3.3 | 122 N1 | 3.3 | | 0.029 | | 2.2 | NA | 0.1 | 1.0 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

**Approach Lane Flows (veh/h)**

East: Reeves Rd (North)

| Mov. From E To Exit: | T1 W | R2 N | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 32 | - | 32 | 3.1 | 1969 | 0.016 | 100 | NA | NA |
| Lane 2 | - | 51 | 51 | 5.9 | 1719 | 0.029 | 100 | 0.0 | 1 |
| Approach | 32 | 51 | 82 | 4.8 | | 0.029 | | | |

North: Aylesbury St

| Mov. From N To Exit: | L2 E | R2 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 10 | 10 | 20 | 0.0 | 1296 | 0.015 | 100 | NA | NA |
| Approach | 10 | 10 | 20 | 0.0 | | 0.015 | | | |

West: Reeves Rd (South)

| Mov. From W To Exit: | L2 N | T1 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 10 | 10 | 20 | 0.0 | 1991 | 0.010 | 100 | NA | NA |

| | | | | | |
|---|---|---|---|---|---|
| Approach | 10 | 10 | 20 | 0.0 | 0.010 |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 122 | 3.3 | 0.029 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

| Merge Analysis | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| East Exit: Reeves Rd (North)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| North Exit: Aylesbury St<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| West Exit: Reeves Rd (South)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |

# LANE SUMMARY

## Site: 5.3 [5.3 Reeves Rd/ Aylesbury St (Site Folder: General)]

**Network: N101 [Construction 1 (Network Folder: PM)]**

New Site
Site Category: (None)
Give-Way (Two-Way)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Reeves Rd (North) | | | | | | | | | | | | | | | |
| Lane 1 | 24 | 4.2 | 24 | 4.2 | 1955 | 0.012 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 55 | 0.0 | 0.0 |
| Lane 2 | 20 | 5.0 | 20 | 5.1 | 1717 | 0.012 | 100 | 4.4 | LOS A | 0.1 | 0.4 | Short | 53 | 0.0 | NA |
| Approach | 44 | 4.5 | 43 [N1] | 4.6 | | 0.012 | | 2.0 | NA | 0.1 | 0.4 | | | | |
| North: Aylesbury St | | | | | | | | | | | | | | | |
| Lane 1 | 53 | 1.9 | 53 | 1.9 | 1477 | 0.036 | 100 | 0.2 | LOS A | 0.1 | 1.0 | Full | 193 | 0.0 | 0.0 |
| Approach | 53 | 1.9 | 53 | 1.9 | | 0.036 | | 0.2 | LOS A | 0.1 | 1.0 | | | | |
| West: Reeves Rd (South) | | | | | | | | | | | | | | | |
| Lane 1 | 26 | 0.0 | 26 | 0.0 | 2003 | 0.013 | 100 | 1.7 | LOS A | 0.0 | 0.0 | Full | 60 | 0.0 | 0.0 |
| Approach | 26 | 0.0 | 26 | 0.0 | | 0.013 | | 1.7 | NA | 0.0 | 0.0 | | | | |
| Intersection | 123 | 2.4 | 122 [N1] | 2.5 | | 0.036 | | 1.1 | NA | 0.1 | 1.0 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

**Approach Lane Flows (veh/h)**

East: Reeves Rd (North)

| Mov. From E To Exit: | T1 W | R2 N | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 24 | - | 24 | 4.2 | 1955 | 0.012 | 100 | NA | NA |
| Lane 2 | - | 20 | 20 | 5.1 | 1717 | 0.012 | 100 | 0.0 | 1 |
| Approach | 24 | 20 | 43 | 4.6 | | 0.012 | | | |

North: Aylesbury St

| Mov. From N To Exit: | L2 E | R2 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 43 | 10 | 53 | 1.9 | 1477 | 0.036 | 100 | NA | NA |
| Approach | 43 | 10 | 53 | 1.9 | | 0.036 | | | |

West: Reeves Rd (South)

| Mov. From W To Exit: | L2 N | T1 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 10 | 16 | 26 | 0.0 | 2003 | 0.013 | 100 | NA | NA |

| | | | | | |
|---|---|---|---|---|---|
| Approach | 10 | 16 | 26 | 0.0 | 0.013 |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 122 | 2.5 | 0.036 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

| Merge Analysis | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| East Exit: Reeves Rd (North)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| North Exit: Aylesbury St<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| West Exit: Reeves Rd (South)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |

# LANE SUMMARY

## Site: 5.4 [5.4 Reeves Rd / William Roberts Rd WR Closure C (Site Folder: General)]

## Network: N101 [Construction 1 (Network Folder: AM)]

New Site
Site Category: (None)
Give-Way (Two-Way)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: William Roberts Rd (South) | | | | | | | | | | | | | | | |
| Lane 1 | 166 | 7.9 | 163 | 8.0 | 1112 | 0.146 | 100 | 2.9 | LOS A | 0.5 | 4.1 | Full | 243 | 0.0 | 0.0 |
| Approach | 166 | 7.9 | 163 [N1] | 8.0 | | 0.146 | | 2.9 | LOS A | 0.5 | 4.1 | | | | |
| East: Reeves Rd (East) | | | | | | | | | | | | | | | |
| Lane 1 | 320 | 7.8 | 320 | 7.8 | 1741 | 0.184 | 100 | 4.1 | LOS A | 0.0 | 0.0 | Full | 266 | 0.0 | 0.0 |
| Approach | 320 | 7.8 | 320 | 7.8 | | 0.184 | | 4.1 | NA | 0.0 | 0.0 | | | | |
| West: Reeves Rd (West) | | | | | | | | | | | | | | | |
| Lane 1 | 11 | 0.0 | 11 | 0.0 | 1960 | 0.005 | 100 | 2.7 | LOS A | 0.0 | 0.0 | Full | 55 | 0.0 | 0.0 |
| Lane 2 | 11 | 0.0 | 11 | 0.0 | 775 | 0.014 | 100 | 6.2 | LOS A | 0.0 | 0.3 | Short | 13 | 0.0 | NA |
| Approach | 21 | 0.0 | 21 | 0.0 | | 0.014 | | 4.5 | LOS A | 0.0 | 0.3 | | | | |
| Intersection | 506 | 7.5 | 504 [N1] | 7.6 | | 0.184 | | 3.8 | NA | 0.5 | 4.1 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

**Approach Lane Flows (veh/h)**

South: William Roberts Rd (South)

| Mov. From S To Exit: | L2 W | R2 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 51 | 112 | 163 | 8.0 | 1112 | 0.146 | 100 | NA | NA |
| Approach | 51 | 112 | 163 | 8.0 | | 0.146 | | | |

East: Reeves Rd (East)

| Mov. From E To Exit: | L2 S | T1 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 284 | 36 | 320 | 7.8 | 1741 | 0.184 | 100 | NA | NA |
| Approach | 284 | 36 | 320 | 7.8 | | 0.184 | | | |

West: Reeves Rd (West)

| Mov. From W To Exit: | T1 E | R2 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 11 | - | 11 | 0.0 | 1960 | 0.005 | 100 | NA | NA |
| Lane 2 | - | 11 | 11 | 0.0 | 775 | 0.014 | 100 | 0.0 | 1 |

| | | | | | |
|---|---|---|---|---|---|
| Approach | 11 | 11 | 21 | 0.0 | 0.014 |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 504 | 7.6 | 0.184 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

**Merge Analysis**

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South Exit: William Roberts Rd (South)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| East Exit: Reeves Rd (East)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| West Exit: Reeves Rd (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |

# LANE SUMMARY

## Site: 5.4 [5.4 Reeves Rd / William Roberts Rd WR Closure C (Site Folder: General)]

## Network: N101 [Construction 1 (Network Folder: PM)]

New Site
Site Category: (None)
Give-Way (Two-Way)

### Lane Use and Performance

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **South: William Roberts Rd (South)** | | | | | | | | | | | | | | | |
| Lane 1 | 234 | 4.7 | 228 | 4.8 | 1052 | 0.216 | 100 | 3.1 | LOS A | 0.8 | 6.0 | Full | 243 | 0.0 | 0.0 |
| Approach | 234 | 4.7 | 228 N1 | 4.8 | | 0.216 | | 3.1 | LOS A | 0.8 | 6.0 | | | | |
| **East: Reeves Rd (East)** | | | | | | | | | | | | | | | |
| Lane 1 | 277 | 8.7 | 277 | 8.7 | 1728 | 0.160 | 100 | 4.3 | LOS A | 0.0 | 0.0 | Full | 266 | 0.0 | 0.0 |
| Approach | 277 | 8.7 | 277 | 8.7 | | 0.160 | | 4.3 | NA | 0.0 | 0.0 | | | | |
| **West: Reeves Rd (West)** | | | | | | | | | | | | | | | |
| Lane 1 | 36 | 2.9 | 36 | 2.9 | 1923 | 0.019 | 100 | 2.7 | LOS A | 0.0 | 0.0 | Full | 55 | 0.0 | 0.0 |
| Lane 2 | 27 | 3.8 | 27 | 3.8 | 729 | 0.038 | 100 | 6.6 | LOS A | 0.1 | 0.9 | Short | 13 | 0.0 | NA |
| Approach | 63 | 3.3 | 63 | 3.3 | | 0.038 | | 4.4 | LOS A | 0.1 | 0.9 | | | | |
| Intersection | 574 | 6.5 | 568 N1 | 6.5 | | 0.216 | | 3.9 | NA | 0.8 | 6.0 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

### Approach Lane Flows (veh/h)

**South: William Roberts Rd (South)**

| Mov. From S To Exit: | L2 W | R2 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 24 | 204 | 228 | 4.8 | 1052 | 0.216 | 100 | NA | NA |
| Approach | 24 | 204 | 228 | 4.8 | | 0.216 | | | |

**East: Reeves Rd (East)**

| Mov. From E To Exit: | L2 S | T1 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 256 | 21 | 277 | 8.7 | 1728 | 0.160 | 100 | NA | NA |
| Approach | 256 | 21 | 277 | 8.7 | | 0.160 | | | |

**West: Reeves Rd (West)**

| Mov. From W To Exit: | T1 E | R2 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 36 | - | 36 | 2.9 | 1923 | 0.019 | 100 | NA | NA |
| Lane 2 | - | 27 | 27 | 3.8 | 729 | 0.038 | 100 | 0.0 | 1 |

| | | | | | |
|---|---|---|---|---|---|
| Approach | 36 | 27 | 63 | 3.3 | 0.038 |
| | Total | %HV | Deg.Satn (v/c) | | |
| Intersection | 568 | 6.5 | 0.216 | | |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

| Merge Analysis | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South Exit: William Roberts Rd (South)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| East Exit: Reeves Rd (East)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| West Exit: Reeves Rd (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |

# LANE SUMMARY

## Site: 7.1 [7.1 William Roberts Rd / Cortina Pl WR Closure (Site Folder: General)]

## Network: N101 [Construction 1 (Network Folder: AM)]

Scheme Design
Site Category: (None)
Give-Way (Two-Way)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NorthEast: William Roberts Road (North) | | | | | | | | | | | | | | | |
| Lane 1 | 319 | 9.4 | 319 | 9.4 | 1216 | 0.262 | 100 | 0.2 | LOS A | 0.2 | 1.2 | Full | 243 | -32.5 N3 | 0.0 |
| Approach | 319 | 9.4 | 319 | 9.4 | | 0.262 | | 0.2 | NA | 0.2 | 1.2 | | | | |
| NorthWest: Cortina Place | | | | | | | | | | | | | | | |
| Lane 1 | 30 | 6.7 | 30 | 6.7 | 764 | 0.039 | 100 | 3.7 | LOS A | 0.1 | 0.8 | Full | 177 | -21.3 N3 | 0.0 |
| Approach | 30 | 6.7 | 30 | 6.7 | | 0.039 | | 3.7 | LOS A | 0.1 | 0.8 | | | | |
| SouthWest: William Roberts Road (South) | | | | | | | | | | | | | | | |
| Lane 1 | 204 | 6.9 | 200 | 6.9 | 1798 | 0.111 | 100 | 0.4 | LOS A | 0.0 | 0.0 | Full | 110 | 0.0 | 0.0 |
| Approach | 204 | 6.9 | 200 N1 | 6.9 | | 0.111 | | 0.4 | NA | 0.0 | 0.0 | | | | |
| Intersection | 553 | 8.3 | 549 N1 | 8.4 | | 0.262 | | 0.5 | NA | 0.2 | 1.2 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.
N3 Capacity Adjustment due to downstream lane blockage determined by the program.

**Approach Lane Flows (veh/h)**

NorthEast: William Roberts Road (North)

| Mov. From NE To Exit: | T1 SW | R2 NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 303 | 16 | 319 | 9.4 | 1216 | 0.262 | 100 | NA | NA |
| Approach | 303 | 16 | 319 | 9.4 | | 0.262 | | | |

NorthWest: Cortina Place

| Mov. From NW To Exit: | L2 NE | R2 SW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 14 | 16 | 30 | 6.7 | 764 | 0.039 | 100 | NA | NA |
| Approach | 14 | 16 | 30 | 6.7 | | 0.039 | | | |

SouthWest: William Roberts Road (South)

| Mov. From SW To Exit: | L2 NW | T1 NE | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 42 | 158 | 200 | 6.9 | 1798 | 0.111 | 100 | NA | NA |
| Approach | 42 | 158 | 200 | 6.9 | | 0.111 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 549 | 8.4 | 0.262 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

**Merge Analysis**

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NorthEast Exit: William Roberts Road (North)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| NorthWest Exit: Cortina Place<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| SouthWest Exit: William Roberts Road (South)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |

# LANE SUMMARY

**Site: 7.1 [7.1 William Roberts Rd / Cortina Pl WR Closure (Site Folder: General)]**

**Network: N101 [Construction 1 (Network Folder: PM)]**

Scheme Design
Site Category: (None)
Give-Way (Two-Way)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NorthEast: William Roberts Road (North) | | | | | | | | | | | | | | | |
| Lane 1 | 288 | 8.7 | 288 | 8.7 | 1351 | 0.213 | 100 | 0.3 | LOS A | 0.2 | 1.3 | Full | 243 | -24.7 N3 | 0.0 |
| Approach | 288 | 8.7 | 288 | 8.7 | | 0.213 | | 0.3 | NA | 0.2 | 1.3 | | | | |
| NorthWest: Cortina Place | | | | | | | | | | | | | | | |
| Lane 1 | 59 | 6.8 | 59 | 6.8 | 698 | 0.085 | 100 | 4.2 | LOS A | 0.2 | 1.8 | Full | 177 | -19.6 N3 | 0.0 |
| Approach | 59 | 6.8 | 59 | 6.8 | | 0.085 | | 4.2 | LOS A | 0.2 | 1.8 | | | | |
| SouthWest: William Roberts Road (South) | | | | | | | | | | | | | | | |
| Lane 1 | 250 | 4.8 | 242 | 4.9 | 1830 | 0.132 | 100 | 0.2 | LOS A | 0.0 | 0.0 | Full | 110 | 0.0 | 0.0 |
| Approach | 250 | 4.8 | 242 N1 | 4.9 | | 0.132 | | 0.2 | NA | 0.0 | 0.0 | | | | |
| Intersection | 597 | 6.9 | 589 N1 | 7.0 | | 0.213 | | 0.7 | NA | 0.2 | 1.8 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.
N3 Capacity Adjustment due to downstream lane blockage determined by the program.

**Approach Lane Flows (veh/h)**

NorthEast: William Roberts Road (North)

| Mov. From NE To Exit: | T1 SW | R2 NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 269 | 19 | 288 | 8.7 | 1351 | 0.213 | 100 | NA | NA |
| Approach | 269 | 19 | 288 | 8.7 | | 0.213 | | | |

NorthWest: Cortina Place

| Mov. From NW To Exit: | L2 NE | R2 SW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 18 | 41 | 59 | 6.8 | 698 | 0.085 | 100 | NA | NA |
| Approach | 18 | 41 | 59 | 6.8 | | 0.085 | | | |

SouthWest: William Roberts Road (South)

| Mov. From SW To Exit: | L2 NW | T1 NE | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 27 | 215 | 242 | 4.9 | 1830 | 0.132 | 100 | NA | NA |
| Approach | 27 | 215 | 242 | 4.9 | | 0.132 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 589 | 7.0 | 0.213 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

| Merge Analysis | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NorthEast Exit: William Roberts Road (North)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| NorthWest Exit: Cortina Place<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| SouthWest Exit: William Roberts Road (South)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |

# LANE SUMMARY

## Site: 2.0 [2.0 Aylesbury St North/Ti Rakau Dr (Site Folder: General)]

## Network: N101 [Construction 1 (Network Folder: AM)]

New Site
Site Category: (None)
Give-Way (Two-Way)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Ti Rakau Drive (East) | | | | | | | | | | | | | | | |
| Lane 1 | 363 | 7.8 | 339 | 7.9 | 1503 | 0.225 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 63 | -15.9 N3 | 0.0 |
| Lane 2 | 439 | 7.8 | 409 | 7.9 | 1816 | 0.225 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 63 | 0.0 | 0.0 |
| Lane 3 | 441 | 7.8 | 411 | 7.9 | 1826 | 0.225 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 63 | 0.0 | 0.0 |
| Approach | 1244 | 7.8 | 1159 N1 | 7.9 | | 0.225 | | 0.0 | NA | 0.0 | 0.0 | | | | |
| East: Aylesbury Street | | | | | | | | | | | | | | | |
| Lane 1 | 14 | 7.1 | 14 | 7.1 | 724 | 0.019 | 100 | 3.2 | LOS A | 0.1 | 0.6 | Full | 28 | 0.0 | 0.0 |
| Lane 2 | 10 | 0.0 | 10 | 0.0 | 6 | 1.667 | 100 | 1303.7 | LOS F | 6.4 | 44.7 | Full | 28 | 0.0 | 21.2 |
| Approach | 24 | 4.2 | 24 | 4.2 | | 1.667 | | 545.0 | LOS F | 6.4 | 44.7 | | | | |
| North: Ti Rakau Drive (West) | | | | | | | | | | | | | | | |
| Lane 1 | 595 | 8.6 | 589 | 8.6 | 1795 | 0.328 | 100 | 0.2 | LOS A | 0.0 | 0.0 | Full | 130 | 0.0 | 0.0 |
| Lane 2 | 449 | 8.7 | 444 | 8.7 | 1354 | 0.328 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 130 | -24.6 N7 | 0.0 |
| Lane 3 | 474 | 8.7 | 469 | 8.7 | 1429 | 0.328 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Short | 55 | -22.5 N7 | NA |
| Approach | 1517 | 8.7 | 1503 N1 | 8.7 | | 0.328 | | 0.1 | NA | 0.0 | 0.0 | | | | |
| Intersection | 2785 | 8.3 | 2686 N1 | 8.6 | | 1.667 | | 4.9 | NA | 6.4 | 44.7 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.
N3 Capacity Adjustment due to downstream lane blockage determined by the program.
N7 The capacity reduction has been determined from the queue blockage probability of a Site further downstream due to intermediate continuous lanes.

**Approach Lane Flows (veh/h)**

South: Ti Rakau Drive (East)

| Mov. From S To Exit: | T1 N | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|
| Lane 1 | 339 | 339 | 7.9 | 1503 | 0.225 | 100 | NA | NA |
| Lane 2 | 409 | 409 | 7.9 | 1816 | 0.225 | 100 | NA | NA |
| Lane 3 | 411 | 411 | 7.9 | 1826 | 0.225 | 100 | NA | NA |
| Approach | 1159 | 1159 | 7.9 | | 0.225 | | | |

East: Aylesbury Street

| Mov. From E | L2 | R2 | Total | %HV | Cap. | Deg. Satn | Lane Util. | Prob. SL Ov. | Ov. Lane |
|---|---|---|---|---|---|---|---|---|---|

| To Exit: | S | N | | | veh/h | v/c | % | % | No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 14 | - | 14 | 7.1 | 724 | 0.019 | 100 | NA | NA |
| Lane 2 | - | 10 | 10 | 0.0 | 6 | 1.667 | 100 | NA | NA |
| Approach | 14 | 10 | 24 | 4.2 | | 1.667 | | | |

North: Ti Rakau Drive (West)

| Mov. From N To Exit: | L2 E | T1 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 19 | 570 | 589 | 8.6 | 1795 | 0.328 | 100 | NA | NA |
| Lane 2 | - | 444 | 444 | 8.7 | 1354 | 0.328 | 100 | NA | NA |
| Lane 3 | - | 469 | 469 | 8.7 | 1429 | 0.328 | 100 | 0.0 | 2 |
| Approach | 19 | 1484 | 1503 | 8.7 | | 0.328 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 2686 | 8.6 | 1.667 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

## Merge Analysis

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South Exit: Ti Rakau Drive (East)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | | |
| East Exit: Aylesbury Street<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| North Exit: Ti Rakau Drive (West)<br>Merge Type: **Priority** | | | | | | | | | | | | |
| Exit Short Lane | 4 | 20 | 0.0 | 411 | 428 | 3.00 | 2.00 | 6 | 1362 | 0.004 | 0.7 | 0.7 |
| Merge Lane | 3 | - | 100.0 | Merge Lane is not Opposed | | | | 411 | 1800 | 0.229 | 0.0 | 0.0 |

# LANE SUMMARY

**Site: 2.0 [2.0 Aylesbury St North/Ti Rakau Dr (Site Folder: General)]**

**Network: N101 [Construction 1 (Network Folder: PM)]**

New Site
Site Category: (None)
Give-Way (Two-Way)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total | HV ] | ARRIVAL FLOWS [ Total | HV ] | Cap. | Deg. Satn | Lane Util. | Aver. Delay | Level of Service | 95% BACK OF QUEUE [ Veh | Dist ] | Lane Config | Lane Length | Cap. Adj. | Prob. Block. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | veh/h | % | veh/h | % | veh/h | v/c | % | sec | | | m | | m | % | % |
| **South: Ti Rakau Drive (East)** | | | | | | | | | | | | | | | |
| Lane 1 | 537 | 7.3 | 513 | 7.3 | 1794 | 0.286 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 63 | 0.0 | 0.0 |
| Lane 2 | 545 | 7.3 | 521 | 7.3 | 1823 | 0.286 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 63 | 0.0 | 0.0 |
| Lane 3 | 548 | 7.3 | 524 | 7.3 | 1832 | 0.286 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 63 | 0.0 | 0.0 |
| Approach | 1630 | 7.3 | 1558 N1 | 7.3 | | 0.286 | | 0.0 | NA | 0.0 | 0.0 | | | | |
| **East: Aylesbury Street** | | | | | | | | | | | | | | | |
| Lane 1 | 36 | 5.6 | 36 | 5.6 | 1047 | 0.034 | 100 | 1.0 | LOS A | 0.1 | 1.0 | Full | 28 | 0.0 | 0.0 |
| Lane 2 | 20 | 5.0 | 20 | 5.0 | 7 | 2.913 | 100 | 2137.3 | LOS F | 15.0 | 109.8 | Full | 28 | 0.0 | 100.0 |
| Approach | 56 | 5.4 | 56 | 5.4 | | 2.913 | | 764.0 | LOS F | 15.0 | 109.8 | | | | |
| **North: Ti Rakau Drive (West)** | | | | | | | | | | | | | | | |
| Lane 1 | 253 | 5.5 | 249 | 5.5 | 1830 | 0.136 | 100 | 0.2 | LOS A | 0.0 | 0.0 | Full | 130 | 0.0 | 0.0 |
| Lane 2 | 253 | 5.7 | 250 | 5.7 | 1831 | 0.136 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 130 | 0.0 | 0.0 |
| Lane 3 | 260 | 5.7 | 256 | 5.7 | 1880 | 0.136 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Short | 55 | 0.0 | NA |
| Approach | 765 | 5.6 | 755 N1 | 5.7 | | 0.136 | | 0.1 | NA | 0.0 | 0.0 | | | | |
| Intersection | 2451 | 6.7 | 2369 N1 | 7.0 | | 2.913 | | 18.1 | NA | 15.0 | 109.8 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

**Approach Lane Flows (veh/h)**

South: Ti Rakau Drive (East)

| Mov. From S To Exit: | T1 N | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|
| Lane 1 | 513 | 513 | 7.3 | 1794 | 0.286 | 100 | NA | NA |
| Lane 2 | 521 | 521 | 7.3 | 1823 | 0.286 | 100 | NA | NA |
| Lane 3 | 524 | 524 | 7.3 | 1832 | 0.286 | 100 | NA | NA |
| Approach | 1558 | 1558 | 7.3 | | 0.286 | | | |

East: Aylesbury Street

| Mov. From E To Exit: | L2 S | R2 N | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 36 | - | 36 | 5.6 | 1047 | 0.034 | 100 | NA | NA |
| Lane 2 | - | 20 | 20 | 5.0 | 7 | 2.913 | 100 | NA | NA |

| Mov. From N To Exit: | L2 E | T1 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Approach | 36 | 20 | 56 | 5.4 | | 2.913 | | | |
| **North: Ti Rakau Drive (West)** | | | | | | | | | |
| Lane 1 | 10 | 240 | 249 | 5.5 | 1830 | 0.136 | 100 | NA | NA |
| Lane 2 | - | 250 | 250 | 5.7 | 1831 | 0.136 | 100 | NA | NA |
| Lane 3 | - | 256 | 256 | 5.7 | 1880 | 0.136 | 100 | 0.0 | 2 |
| Approach | 10 | 745 | 755 | 5.7 | | 0.136 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 2369 | 7.0 | 2.913 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

## Merge Analysis

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | Opposing Flow Rate pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South Exit: Ti Rakau Drive (East)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | | |
| East Exit: Aylesbury Street<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| North Exit: Ti Rakau Drive (West)<br>Merge Type: **Priority** | | | | | | | | | | | | |
| Exit Short Lane | 4 | 20 | 0.0 | 524 | 543 | 3.00 | 2.00 | 7 | 1241 | 0.006 | 0.9 | 1.0 |
| Merge Lane | 3 | - | 100.0 | Merge Lane is not Opposed | | | | 524 | 1800 | 0.291 | 0.0 | 0.0 |

# LANE SUMMARY

## Site: 4.0 [4.0 Aylesbury St South/ Ti Rakau Dr (Site Folder: General)]

## Network: N101 [Construction 1 (Network Folder: AM)]

New Site
Site Category: (None)
Give-Way (Two-Way)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total | HV ] | ARRIVAL FLOWS [ Total | HV ] | Cap. | Deg. Satn | Lane Util. | Aver. Delay | Level of Service | 95% BACK OF QUEUE [ Veh | Dist ] | Lane Config | Lane Length | Cap. Adj. | Prob. Block. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | veh/h | % | veh/h | % | veh/h | v/c | % | sec | | | m | | m | % | % |
| **South: Ti Rakau Drive (East)** | | | | | | | | | | | | | | | |
| Lane 1 | 402 | 7.8 | 390 | 7.7 | 1779 | 0.219 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 84 | 0.0 | 0.0 |
| Lane 2 | 410 | 7.8 | 399 | 7.7 | 1818 | 0.219 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 84 | 0.0 | 0.0 |
| Lane 3 | 403 | 7.8 | 391 | 7.7 | 1784 | 0.219 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 84 | 0.0 | 0.0 |
| Lane 4 | 20 | 5.0 | 19 | 4.9 | 100 | 0.195 | 100 | 40.0 | LOS E | 0.5 | 3.4 | Short | 21 | 0.0 | NA |
| Approach | 1235 | 7.8 | 1200[N1] | 7.7 | | 0.219 | | 0.7 | NA | 0.5 | 3.4 | | | | |
| **East: Aylesbury St** | | | | | | | | | | | | | | | |
| Lane 1 | 12 | 0.0 | 12 | 0.0 | 681 | 0.018 | 100 | 2.0 | LOS A | 0.0 | 0.3 | Full | 93 | -18.8[N3] | 0.0 |
| Approach | 12 | 0.0 | 12 | 0.0 | | 0.018 | | 2.0 | LOS A | 0.0 | 0.3 | | | | |
| **North: Ti Rakau Drive (West)** | | | | | | | | | | | | | | | |
| Lane 1 | 451 | 8.6 | 434 | 8.6 | 1489 | 0.292 | 100 | 0.1 | LOS A | 0.0 | 0.0 | Full | 45 | -18.4[N3] | 0.0 |
| Lane 2 | 541 | 8.8 | 521 | 8.8 | 1787 | 0.292 | 100 | 0.0 | LOS A | 9.8[N6] | 73.4[N6] | Full | 45 | 0.0 | 50.0[N6] |
| Lane 3 | 547 | 8.8 | 527 | 8.8 | 1806 | 0.292 | 100 | 0.0 | LOS A | 9.8[N6] | 73.4[N6] | Full | 45 | 0.0 | 50.0[N6] |
| Approach | 1540 | 8.7 | 1482[N1] | 8.8 | | 0.292 | | 0.0 | NA | 9.8 | 73.4 | | | | |
| Intersection | 2787 | 8.3 | 2694[N1] | 8.5 | | 0.292 | | 0.3 | NA | 9.8 | 73.4 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.
N3 Capacity Adjustment due to downstream lane blockage determined by the program.
N6 Continuous Lane results determined by Back of Queue values of downstream lanes (proportional to lane movement flows) but average back of queue has been restricted to the available queue storage space.

**Approach Lane Flows (veh/h)**

South: Ti Rakau Drive (East)

| Mov. From S To Exit: | T1 N | R2 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 390 | - | 390 | 7.7 | 1779 | 0.219 | 100 | NA | NA |
| Lane 2 | 399 | - | 399 | 7.7 | 1818 | 0.219 | 100 | NA | NA |
| Lane 3 | 391 | - | 391 | 7.7 | 1784 | 0.219 | 100 | NA | NA |
| Lane 4 | - | 19 | 19 | 4.9 | 100 | 0.195 | 100 | 0.0 | 3 |
| Approach | 1181 | 19 | 1200 | 7.7 | | 0.219 | | | |

East: Aylesbury St

| Mov. | L2 | Total | %HV | Deg. | Lane | Prob. | Ov. |
|---|---|---|---|---|---|---|---|

| From E<br>To Exit: | <br>S | | | | Cap.<br>veh/h | Satn<br>v/c | Util.<br>% | SL Ov.<br>% | Lane<br>No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 12 | 12 | 0.0 | | 681 | 0.018 | 100 | NA | NA |
| Approach | 12 | 12 | 0.0 | | | 0.018 | | | |

North: Ti Rakau Drive (West)

| Mov.<br>From N<br>To Exit: | L2<br><br>E | T1<br><br>S | Total | %HV | Cap.<br>veh/h | Deg.<br>Satn<br>v/c | Lane<br>Util.<br>% | Prob.<br>SL Ov.<br>% | Ov.<br>Lane<br>No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 10 | 425 | 434 | 8.6 | 1489 | 0.292 | 100 | NA | NA |
| Lane 2 | - | 521 | 521 | 8.8 | 1787 | 0.292 | 100 | NA | NA |
| Lane 3 | - | 527 | 527 | 8.8 | 1806 | 0.292 | 100 | NA | NA |
| Approach | 10 | 1472 | 1482 | 8.8 | | 0.292 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 2694 | 8.5 | 0.292 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

**Merge Analysis**

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South Exit: Ti Rakau Drive (East)<br>Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | |
| East Exit: Aylesbury St<br>Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| North Exit: Ti Rakau Drive (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | |

# LANE SUMMARY

## Site: 4.0 [4.0 Aylesbury St South/ Ti Rakau Dr (Site Folder: General)]

## Network: N101 [Construction 1 (Network Folder: PM)]

New Site
Site Category: (None)
Give-Way (Two-Way)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **South: Ti Rakau Drive (East)** | | | | | | | | | | | | | | | |
| Lane 1 | 536 | 7.3 | 524 | 7.3 | 1784 | 0.294 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 84 | 0.0 | 0.0 |
| Lane 2 | 547 | 7.3 | 536 | 7.3 | 1823 | 0.294 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 84 | 0.0 | 0.0 |
| Lane 3 | 538 | 7.3 | 526 | 7.3 | 1791 | 0.294 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 84 | 0.0 | 0.0 |
| Lane 4 | 10 | 10.0 | 10 | 9.9 | 357 | 0.027 | 100 | 12.1 | LOS B | 0.1 | 0.5 | Short | 21 | 0.0 | NA |
| Approach | 1631 | 7.4 | 1596[N1] | 7.3 | | 0.294 | | 0.1 | NA | 0.1 | 0.5 | | | | |
| **East: Aylesbury St** | | | | | | | | | | | | | | | |
| Lane 1 | 40 | 10.0 | 40 | 10.0 | 982 | 0.041 | 100 | 1.1 | LOS A | 0.1 | 1.1 | Full | 93 | 0.0 | 0.0 |
| Approach | 40 | 10.0 | 40 | 10.0 | | 0.041 | | 1.1 | LOS A | 0.1 | 1.1 | | | | |
| **North: Ti Rakau Drive (West)** | | | | | | | | | | | | | | | |
| Lane 1 | 267 | 5.8 | 255 | 5.9 | 1855 | 0.137 | 100 | 0.1 | LOS A | 0.0 | 0.0 | Full | 45 | 0.0 | 0.0 |
| Lane 2 | 262 | 6.0 | 250 | 6.2 | 1817 | 0.137 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 45 | 0.0 | 0.0 |
| Lane 3 | 264 | 6.0 | 252 | 6.2 | 1836 | 0.137 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 45 | 0.0 | 0.0 |
| Approach | 793 | 5.9 | 757[N1] | 6.1 | | 0.137 | | 0.1 | NA | 0.0 | 0.0 | | | | |
| Intersection | 2464 | 6.9 | 2393[N1] | 7.1 | | 0.294 | | 0.1 | NA | 0.1 | 1.1 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

**Approach Lane Flows (veh/h)**

South: Ti Rakau Drive (East)

| Mov. From S To Exit: | T1 N | R2 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 524 | - | 524 | 7.3 | 1784 | 0.294 | 100 | NA | NA |
| Lane 2 | 536 | - | 536 | 7.3 | 1823 | 0.294 | 100 | NA | NA |
| Lane 3 | 526 | - | 526 | 7.3 | 1791 | 0.294 | 100 | NA | NA |
| Lane 4 | - | 10 | 10 | 9.9 | 357 | 0.027 | 100 | 0.0 | 3 |
| Approach | 1586 | 10 | 1596 | 7.3 | | 0.294 | | | |

East: Aylesbury St

| Mov. From E To Exit: | L2 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|
| Lane 1 | 40 | 40 | 10.0 | 982 | 0.041 | 100 | NA | NA |

| Approach | 40 | 40 | 10.0 | | 0.041 | | | |
|---|---|---|---|---|---|---|---|---|

North: Ti Rakau Drive (West)

| Mov. From N To Exit: | L2 E | T1 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 10 | 245 | 255 | 5.9 | 1855 | 0.137 | 100 | NA | NA |
| Lane 2 | - | 250 | 250 | 6.2 | 1817 | 0.137 | 100 | NA | NA |
| Lane 3 | - | 252 | 252 | 6.2 | 1836 | 0.137 | 100 | NA | NA |
| Approach | 10 | 747 | 757 | 6.1 | | 0.137 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 2393 | 7.1 | 0.294 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

**Merge Analysis**

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South Exit: Ti Rakau Drive (East)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | | |
| East Exit: Aylesbury St<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| North Exit: Ti Rakau Drive (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | | |

# LANE SUMMARY

## Site: 5.0 [5.0 Pakuranga HWY/ Reeves Rd Mitigation 1 C (Site Folder: General)]

## Network: N101 [Construction 1 (Network Folder: AM)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated    Cycle Time = 65 seconds (Site User-Given Phase Times)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total | HV ] | ARRIVAL FLOWS [ Total | HV ] | Cap. | Deg. Satn | Lane Util. | Aver. Delay | Level of Service | 95% BACK OF QUEUE [ Veh | Dist ] | Lane Config | Lane Length | Cap. Adj. | Prob. Block. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | veh/h | % | veh/h | % | veh/h | v/c | % | sec | | | m | | m | % | % |
| **SouthEast: Ti Rakau Drive (East)** | | | | | | | | | | | | | | | |
| Lane 1 | 635 | 9.5 | 598 | 9.4 | 764 [1] | 0.782 | 100 | 112.7 | LOS F | 15.2 | 115.0 | Short | 50 | 0.0 | NA |
| Lane 2 | 635 | 9.5 | 598 | 9.4 | 764 [1] | 0.782 | 100 | 19.2 | LOS B | 15.2 | 115.0 | Full | 90 | 0.0 | 27.3 [8] |
| Lane 3 | 308 | 11.3 | 290 | 11.3 | 520 | 0.559 | 100 | 21.6 | LOS C | 8.0 | 61.6 | Full | 90 | 0.0 | 0.0 |
| Lane 4 | 311 | 11.3 | 293 | 11.3 | 525 | 0.559 | 100 | 21.6 | LOS C | 8.1 | 62.3 | Full | 90 | 0.0 | 0.0 |
| Approach | 1889 | 10.1 | 1780 [N1] | 10.0 | | 0.782 | | 51.4 | LOS D | 15.2 | 115.0 | | | | |
| **NorthWest: Ti Rakau Drive (West)** | | | | | | | | | | | | | | | |
| Lane 1 | 403 | 18.9 | 389 | 19.1 | 528 | 0.735 | 73 [5] | 24.2 | LOS C | 12.0 | 97.8 | Full | 84 | 0.0 | 18.8 |
| Lane 2 | 577 | 5.2 | 555 | 5.2 | 554 | 1.002 | 100 | 75.9 | LOS E | 18.7 [N4] | 137.1 [N4] | Full | 84 | 0.0 | 50.0 |
| Lane 3 | 562 | 5.2 | 541 | 5.2 | 540 | 1.002 | 100 | 76.2 | LOS E | 18.7 [N4] | 137.1 [N4] | Full | 84 | 0.0 | 50.0 |
| Approach | 1542 | 8.8 | 1484 [N1] | 8.8 | | 1.002 | | 62.5 | LOS E | 18.7 | 137.1 | | | | |
| **SouthWest: Pakuranga HWY** | | | | | | | | | | | | | | | |
| Lane 1 | 306 | 4.4 | 306 | 4.4 | 1053 | 0.291 | 100 | 14.9 | LOS B | 4.9 | 35.3 | Short | 308 | 0.0 | NA |
| Lane 2 | 311 | 4.4 | 311 | 4.4 | 1069 | 0.291 | 100 | 14.9 | LOS B | 4.9 | 35.8 | Short | 132 | 0.0 | NA |
| Lane 3 | 273 | 8.8 | 273 | 8.8 | 317 | 0.860 | 100 | 44.0 | LOS D | 10.2 | 77.0 | Full | 1650 | 0.0 | 0.0 |
| Lane 4 | 276 | 8.8 | 276 | 8.8 | 321 | 0.860 | 100 | 43.9 | LOS D | 10.3 | 77.7 | Full | 1650 | 0.0 | 0.0 |
| Lane 5 | 276 | 8.8 | 276 | 8.8 | 321 | 0.860 | 100 | 43.9 | LOS D | 10.3 | 77.7 | Short | 277 | 0.0 | NA |
| Approach | 1442 | 6.9 | 1442 | 6.9 | | 0.860 | | 31.5 | LOS C | 10.3 | 77.7 | | | | |
| Intersection | 4873 | 8.7 | 4706 [N1] | 9.1 | | 1.002 | | 48.8 | LOS D | 18.7 | 137.1 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
5 Lane under-utilisation found by the program
8 Probability of Blockage has been set on the basis of a queue that overflows from a short lane.
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.
N4 Average back of queue has been restricted to the available queue storage space.

**Approach Lane Flows (veh/h)**

SouthEast: Ti Rakau Drive (East)

| Mov. From SE To Exit: | L2 SW | T1 NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 598 | - | 598 | 9.4 | 764 [1] | 0.782 | 100 | 82.9 | 2 |
| Lane 2 | 598 | - | 598 | 9.4 | 764 [1] | 0.782 | 100 | NA | NA |
| Lane 3 | - | 290 | 290 | 11.3 | 520 | 0.559 | 100 | NA | NA |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Lane 4 | - | 293 | 293 | 11.3 | 525 | 0.559 | 100 | NA | NA |
| Approach | 1196 | 584 | 1780 | 10.0 | | 0.782 | | | |

| NorthWest: Ti Rakau Drive (West) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Mov. From NW To Exit: | T1 SE | R2 SW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 389 | - | 389 | 19.1 | 528 | 0.735 | 73 [5] | NA | NA |
| Lane 2 | - | 555 | 555 | 5.2 | 554 | 1.002 | 100 | NA | NA |
| Lane 3 | - | 541 | 541 | 5.2 | 540 | 1.002 | 100 | NA | NA |
| Approach | 389 | 1096 | 1484 | 8.8 | | 1.002 | | | |

| SouthWest: Pakuranga HWY | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Mov. From SW To Exit: | L2 NW | R2 SE | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 306 | - | 306 | 4.4 | 1053 | 0.291 | 100 | 0.0 | 3 |
| Lane 2 | 311 | - | 311 | 4.4 | 1069 | 0.291 | 100 | 0.0 | 3 |
| Lane 3 | - | 273 | 273 | 8.8 | 317 | 0.860 | 100 | NA | NA |
| Lane 4 | - | 276 | 276 | 8.8 | 321 | 0.860 | 100 | NA | NA |
| Lane 5 | - | 276 | 276 | 8.8 | 321 | 0.860 | 100 | 0.0 | 4 |
| Approach | 617 | 825 | 1442 | 6.9 | | 0.860 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 4706 | 9.1 | 1.002 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

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

5 Lane under-utilisation found by the program

## Merge Analysis

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | Opposing Flow Rate pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast Exit: Ti Rakau Drive (East)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | | |
| NorthWest Exit: Ti Rakau Drive (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | | |
| SouthWest Exit: Pakuranga HWY<br>Merge Type: **Priority** | | | | | | | | | | | | |
| Exit Short Lane | 1 | 356 | 0.0 | 1152 | 1194 | 3.00 | 2.00 | 598 | 553 | 1.080 | 4.1 | 93.5 |
| Merge Lane | 2 | - | 100.0 | Merge Lane is not Opposed | | | | 1152 | 1800 | 0.640 | 0.0 | 0.0 |

# LANE SUMMARY

## Site: 5.0 [5.0 Pakuranga HWY/ Reeves Rd Mitigation 1 C (Site Folder: General)]

## Network: N101 [Construction 1 (Network Folder: PM)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated    Cycle Time = 40 seconds (Site Practical Cycle Time)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total | HV ] | ARRIVAL FLOWS [ Total | HV ] | Cap. | Deg. Satn | Lane Util. | Aver. Delay | Level of Service | 95% BACK OF QUEUE [ Veh | Dist ] | Lane Config | Lane Length | Cap. Adj. | Prob. Block. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | veh/h | % | veh/h | % | veh/h | v/c | % | sec | | | m | | m | % | % |
| SouthEast: Ti Rakau Drive (East) | | | | | | | | | | | | | | | |
| Lane 1 | 603 | 7.1 | 568 | 6.8 | 858 | 0.662 | 100 | 15.7 | LOS B | 8.8 | 65.3 | Short | 50 | 0.0 | NA |
| Lane 2 | 603 | 7.1 | 568 | 6.8 | 858 | 0.662 | 100 | 13.2 | LOS B | 8.8 | 65.3 | Full | 90 | 0.0 | 0.0 |
| Lane 3 | 313 | 7.9 | 295 | 7.8 | 363 | 0.812 | 100 | 21.5 | LOS C | 6.7 | 50.1 | Full | 90 | 0.0 | 0.0 |
| Lane 4 | 316 | 7.9 | 298 | 7.8 | 367 | 0.812 | 100 | 21.5 | LOS C | 6.8 | 50.6 | Full | 90 | 0.0 | 0.0 |
| Approach | 1835 | 7.4 | 1728[N1] | 7.2 | | 0.812 | | 16.9 | LOS B | 8.8 | 65.3 | | | | |
| NorthWest: Ti Rakau Drive (West) | | | | | | | | | | | | | | | |
| Lane 1 | 280 | 5.5 | 268 | 5.7 | 372 | 0.719 | 100 | 18.8 | LOS B | 5.6 | 40.9 | Full | 84 | 0.0 | 0.0 |
| Lane 2 | 283 | 5.6 | 271 | 5.8 | 376 | 0.719 | 100 | 19.1 | LOS B | 5.6 | 41.4 | Full | 84 | 0.0 | 0.0 |
| Lane 3 | 259 | 7.6 | 248 | 7.6 | 345 | 0.719 | 100 | 23.5 | LOS C | 5.2 | 38.8 | Full | 84 | 0.0 | 0.0 |
| Approach | 822 | 6.2 | 786[N1] | 6.4 | | 0.719 | | 20.4 | LOS C | 5.6 | 41.4 | | | | |
| SouthWest: Pakuranga HWY | | | | | | | | | | | | | | | |
| Lane 1 | 495 | 6.9 | 495 | 6.9 | 885 | 0.560 | 100 | 15.4 | LOS B | 6.9 | 51.4 | Short | 308 | 0.0 | NA |
| Lane 2 | 503 | 6.9 | 503 | 6.9 | 899 | 0.560 | 100 | 15.4 | LOS B | 7.0 | 52.2 | Short | 132 | 0.0 | NA |
| Lane 3 | 202 | 3.4 | 202 | 3.4 | 268 | 0.754 | 100 | 28.7 | LOS C | 4.4 | 32.0 | Full | 1650 | 0.0 | 0.0 |
| Lane 4 | 204 | 3.4 | 204 | 3.4 | 270 | 0.754 | 100 | 28.6 | LOS C | 4.5 | 32.3 | Full | 1650 | 0.0 | 0.0 |
| Lane 5 | 204 | 3.4 | 204 | 3.4 | 270 | 0.754 | 100 | 28.6 | LOS C | 4.5 | 32.3 | Short | 277 | 0.0 | NA |
| Approach | 1608 | 5.6 | 1608 | 5.6 | | 0.754 | | 20.4 | LOS C | 7.0 | 52.2 | | | | |
| Intersection | 4265 | 6.5 | 4123[N1] | 6.7 | | 0.812 | | 18.9 | LOS B | 8.8 | 65.3 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

**Approach Lane Flows (veh/h)**

SouthEast: Ti Rakau Drive (East)

| Mov. From SE To Exit: | L2 SW | T1 NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 568 | - | 568 | 6.8 | 858 | 0.662 | 100 | 29.3 | 2 |
| Lane 2 | 568 | - | 568 | 6.8 | 858 | 0.662 | 100 | NA | NA |
| Lane 3 | - | 295 | 295 | 7.8 | 363 | 0.812 | 100 | NA | NA |
| Lane 4 | - | 298 | 298 | 7.8 | 367 | 0.812 | 100 | NA | NA |
| Approach | 1135 | 593 | 1728 | 7.2 | | 0.812 | | | |

NorthWest: Ti Rakau Drive (West)

| Mov. From NW | T1 | R2 | Total | %HV | Cap. | Deg. Satn | Lane Util. | Prob. SL Ov. | Ov. Lane |
|---|---|---|---|---|---|---|---|---|---|

| To Exit: | SE | SW | | | veh/h | v/c | % | % | No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 268 | - | 268 | 5.7 | 372 | 0.719 | 100 | NA | NA |
| Lane 2 | 253 | 18 | 271 | 5.8 | 376 | 0.719 | 100 | NA | NA |
| Lane 3 | - | 248 | 248 | 7.6 | 345 | 0.719 | 100 | NA | NA |
| Approach | 521 | 266 | 786 | 6.4 | | 0.719 | | | |

SouthWest: Pakuranga HWY

| Mov. From SW To Exit: | L2 NW | R2 SE | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 495 | - | 495 | 6.9 | 885 | 0.560 | 100 | 0.0 | 3 |
| Lane 2 | 503 | - | 503 | 6.9 | 899 | 0.560 | 100 | 0.0 | 3 |
| Lane 3 | - | 202 | 202 | 3.4 | 268 | 0.754 | 100 | NA | NA |
| Lane 4 | - | 204 | 204 | 3.4 | 270 | 0.754 | 100 | NA | NA |
| Lane 5 | - | 204 | 204 | 3.4 | 270 | 0.754 | 100 | 0.0 | 4 |
| Approach | 998 | 610 | 1608 | 5.6 | | 0.754 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 4123 | 6.7 | 0.812 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

## Merge Analysis

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast Exit: Ti Rakau Drive (East) Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | | |
| NorthWest Exit: Ti Rakau Drive (West) Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | | |
| SouthWest Exit: Pakuranga HWY Merge Type: **Priority** | | | | | | | | | | | | |
| Exit Short Lane | 1 | 356 | 0.0 | 585 | 605 | 3.00 | 2.00 | 568 | 1175 | 0.483 | 1.1 | 2.5 |
| Merge Lane | 2 | - | 100.0 | Merge Lane is not Opposed | | | | 585 | 1800 | 0.325 | 0.0 | 0.0 |

# CCG LANE SUMMARY

## Common Control Group: CCG1 [WR/ Mattson]

**Network: N101 [Construction 1 (Network Folder: AM)]**

EQUISAT (Fixed-Time/SCATS) Isolated    Cycle Time = 131 seconds (CCG User-Given Phase Times)

**Lane Use and Performance (CCG)**

| | DEMAND FLOWS [ Total veh/h | DEMAND FLOWS HV ] % | ARRIVAL FLOWS [ Total veh/h | ARRIVAL FLOWS HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh | 95% BACK OF QUEUE Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Site: 6.5 [6.5 William Roberts Rd / Ti Rakau Dr C]** | | | | | | | | | | | | | | | |
| SouthEast: Ti Rakau Drive (East) | | | | | | | | | | | | | | | |
| Lane 1 | 525 | 10.3 | 487 | 10.2 | 1069 | 0.455 | 100 | 16.0 | LOS B | 12.9 [N4] | 97.9 [N4] | Full | 60 | 0.0 | 50.0 |
| Lane 2 | 525 | 10.3 | 487 | 10.2 | 1069 | 0.455 | 100 | 14.3 | LOS B | 12.9 [N4] | 97.9 [N4] | Full | 60 | 0.0 | 50.0 |
| Lane 3 | 482 | 10.3 | 447 | 10.2 | 982 [1] | 0.455 | 100 | 13.3 | LOS B | 12.1 | 91.8 | Full | 60 | 0.0 | 43.9 |
| Lane 4 | 45 | 4.4 | 42 | 4.4 | 386 | 0.108 | 100 | 45.4 | LOS D | 1.9 | 13.7 | Short | 20 | 0.0 | NA |
| Approach | 1578 | 10.1 | 1461 [N1] | 10.0 | | 0.455 | | 15.5 | LOS B | 12.9 | 97.9 | | | | |
| NorthEast: William Roberts Road Extension | | | | | | | | | | | | | | | |
| Lane 1 | 33 | 12.1 | 33 | 12.1 | 312 | 0.106 | 100 | 50.1 | LOS D | 1.8 | 13.6 | Short | 80 | 0.0 | NA |
| Lane 2 | 281 | 8.5 | 281 | 8.5 | 319 | 0.881 | 100 | 69.9 | LOS E | 20.0 | 150.6 | Full | 110 | 0.0 | 33.6 |
| Approach | 314 | 8.9 | 314 | 8.9 | | 0.881 | | 67.8 | LOS E | 20.0 | 150.6 | | | | |
| NorthWest: Ti Rakau Drive (West) | | | | | | | | | | | | | | | |
| Lane 1 | 182 | 7.1 | 180 | 7.1 | 819 | 0.220 | 100 | 26.7 | LOS C | 6.7 | 50.0 | Full | 107 | 0.0 | 0.0 |
| Lane 2 | 527 | 12.8 | 521 | 12.8 | 684 | 0.762 | 100 | 25.6 | LOS C | 17.8 | 138.1 | Full | 107 | 0.0 | 28.2 |
| Lane 3 | 473 | 12.8 | 468 | 12.8 | 614 [1] | 0.762 | 100 | 23.1 | LOS C | 14.3 | 111.0 | Full | 107 | 0.0 | 8.3 |
| Lane 4 | 49 | 16.3 | 48 | 16.3 | 115 | 0.422 | 100 | 70.3 | LOS E | 3.1 | 24.7 | Short | 20 | 0.0 | NA |
| Approach | 1231 | 12.1 | 1217 [N1] | 12.1 | | 0.762 | | 26.6 | LOS C | 17.8 | 138.1 | | | | |
| Intersection | 3123 | 10.8 | 2992 [N1] | 11.3 | | 0.881 | | 25.5 | LOS C | 20.0 | 150.6 | | | | |
| **Site: 7.0 [7.0 Mattson Rd/ Ti Rakau Dr C]** | | | | | | | | | | | | | | | |
| SouthEast: Ti Rakau Drive (East) | | | | | | | | | | | | | | | |
| Lane 1 | 427 | 9.3 | 393 | 9.2 | 503 [1] | 0.782 | 100 | 14.3 | LOS B | 13.0 | 98.5 | Short | 25 | -48.1 [N7] | NA |
| Lane 2 | 367 | 9.5 | 337 | 9.4 | 432 [1] | 0.782 | 100 | 12.6 | LOS B | 8.8 | 66.5 | Full | 143 | -50.0 [N3] | 0.0 |
| Lane 3 | 701 | 11.7 | 646 | 11.8 | 826 | 0.782 | 100 | 6.5 | LOS A | 20.8 | 160.0 | Full | 143 | -43.9 [N3] | 15.2 |
| Approach | 1495 | 10.5 | 1376 [N1] | 10.4 | | 0.782 | | 10.2 | LOS B | 20.8 | 160.0 | | | | |
| NorthWest: Ti Rakau Drive (West) | | | | | | | | | | | | | | | |
| Lane 1 | 531 | 11.5 | 524 | 11.5 | 1185 | 0.443 | 100 | 2.4 | LOS A | 3.4 | 26.5 | Full | 60 | 0.0 | 0.0 |
| Lane 2 | 524 | 13.7 | 517 | 13.7 | 1169 | 0.443 | 100 | 2.6 | LOS A | 3.7 | 28.7 | Full | 60 | 0.0 | 0.0 |
| Approach | 1055 | 12.6 | 1042 [N1] | 12.6 | | 0.443 | | 2.5 | LOS A | 3.7 | 28.7 | | | | |
| SouthWest: Mattson Road | | | | | | | | | | | | | | | |
| Lane 1 | 53 | 5.5 | 53 | 5.5 | 81 | 0.651 | 100 | 73.6 | LOS E | 3.6 | 26.6 | Full | 282 | -50.0 [N7] | 0.0 |
| Lane 2 | 56 | 5.5 | 56 | 5.5 | 86 | 0.651 | 100 | 73.2 | LOS E | 3.8 | 28.0 | Full | 282 | -47.1 [N3] | 0.0 |
| Approach | 109 | 5.5 | 109 | 5.5 | | 0.651 | | 73.4 | LOS E | 3.8 | 28.0 | | | | |
| Intersection | 2659 | 11.1 | 2527 [N1] | 11.7 | | 0.782 | | 9.7 | LOS A | 20.8 | 160.0 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.
N3 Capacity Adjustment due to downstream lane blockage determined by the program.
N4 Average back of queue has been restricted to the available queue storage space.
N7 The capacity reduction has been determined from the queue blockage probability of a Site further downstream due to intermediate continuous lanes.

## Approach Lane Flows (CCG) (veh/h)

Site: 6.5 [6.5 William Roberts Rd / Ti Rakau Dr C]

SouthEast: Ti Rakau Drive (East)

| Mov. From SE To Exit: | T1 NW | R2 NE | U SE | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 487 | - | - | 487 | 10.2 | 1069 | 0.455 | 100 | NA | NA |
| Lane 2 | 487 | - | - | 487 | 10.2 | 1069 | 0.455 | 100 | NA | NA |
| Lane 3 | 447 | - | - | 447 | 10.2 | 982[1] | 0.455 | 100 | NA | NA |
| Lane 4 | - | 20 | 21 | 42 | 4.4 | 386 | 0.108 | 100 | 0.0 | 3 |
| Approach | 1420 | 20 | 21 | 1461 | 10.0 | | 0.455 | | | |

NorthEast: William Roberts Road Extension

| Mov. From NE To Exit: | L2 SE | R2 NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 33 | - | 33 | 12.1 | 312 | 0.106 | 100 | 0.0 | 2 |
| Lane 2 | - | 281 | 281 | 8.5 | 319 | 0.881 | 100 | NA | NA |
| Approach | 33 | 281 | 314 | 8.9 | | 0.881 | | | |

NorthWest: Ti Rakau Drive (West)

| Mov. From NW To Exit: | L2 NE | T1 SE | U NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 180 | - | - | 180 | 7.1 | 819 | 0.220 | 100 | NA | NA |
| Lane 2 | - | 521 | - | 521 | 12.8 | 684 | 0.762 | 100 | NA | NA |
| Lane 3 | - | 468 | - | 468 | 12.8 | 614[1] | 0.762 | 100 | NA | NA |
| Lane 4 | - | - | 48 | 48 | 16.3 | 115 | 0.422 | 100 | 24.3 | 3 |
| Approach | 180 | 988 | 48 | 1217 | 12.1 | | 0.762 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 2992 | 11.3 | 0.881 |

Site: 7.0 [7.0 Mattson Rd/ Ti Rakau Dr C]

SouthEast: Ti Rakau Drive (East)

| Mov. From SE To Exit: | L2 SW | T1 NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 28 | 365 | 393 | 9.2 | 503[1] | 0.782 | 100 | 100.0 | 2 |
| Lane 2 | - | 337 | 337 | 9.4 | 432[1] | 0.782 | 100 | NA | NA |
| Lane 3 | - | 646 | 646 | 11.8 | 826 | 0.782 | 100 | NA | NA |
| Approach | 28 | 1348 | 1376 | 10.4 | | 0.782 | | | |

NorthWest: Ti Rakau Drive (West)

| Mov. From NW To Exit: | T1 SE | Total | %HV | | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 524 | 524 | 11.5 | | 1185 | 0.443 | 100 | NA | NA |
| Lane 2 | 517 | 517 | 13.7 | | 1169 | 0.443 | 100 | NA | NA |
| Approach | 1042 | 1042 | 12.6 | | | 0.443 | | | |
| SouthWest: Mattson Road | | | | | | | | | |
| Mov. From SW To Exit: | L2 NW | Total | %HV | | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 53 | 53 | 5.5 | | 81 | 0.651 | 100 | NA | NA |
| Lane 2 | 56 | 56 | 5.5 | | 86 | 0.651 | 100 | NA | NA |
| Approach | 109 | 109 | 5.5 | | | 0.651 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 2527 | 11.7 | 0.782 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

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

| Merge Analysis (CCG) | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Site: 6.5 [6.5 William Roberts Rd / Ti Rakau Dr C] | | | | | | | | | | | |
| SouthEast Exit: Ti Rakau Drive (East)<br>Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | |
| NorthEast Exit: William Roberts Road Extension<br>Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| NorthWest Exit: Ti Rakau Drive (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | |
| Site: 7.0 [7.0 Mattson Rd/ Ti Rakau Dr C] | | | | | | | | | | | |
| SouthEast Exit: Ti Rakau Drive (East)<br>Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | |
| NorthWest Exit: Ti Rakau Drive (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | |
| SouthWest Exit: Mattson Road<br>Merge Type: **Not Applied** | | | | | | | | | | | |

# CCG LANE SUMMARY

## Common Control Group: CCG1 [WR/ Mattson]

**Network: N101 [Construction 1 (Network Folder: PM)]**

EQUISAT (Fixed-Time/SCATS) Isolated     Cycle Time = 150 seconds (CCG User-Given Phase Times)

| Lane Use and Performance (CCG) | DEMAND FLOWS [ Total | HV ] | ARRIVAL FLOWS [ Total | HV ] | Cap. | Deg. Satn | Lane Util. | Aver. Delay | Level of Service | 95% BACK OF QUEUE [ Veh | Dist ] | Lane Config | Lane Length | Cap. Adj. | Prob. Block. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | veh/h | % | veh/h | % | veh/h | v/c | % | sec | | | m | | m | % | % |
| **Site: 6.5 [6.5 William Roberts Rd / Ti Rakau Dr C]** | | | | | | | | | | | | | | | |
| SouthEast: Ti Rakau Drive (East) | | | | | | | | | | | | | | | |
| Lane 1 | 510 | 7.6 | 473 | 7.3 | 815 | 0.580 | 100 | 7.4 | LOS A | 8.6 | 64.0 | Full | 60 | 0.0 | 10.8 |
| Lane 2 | 510 | 7.6 | 473 | 7.3 | 815 | 0.580 | 100 | 3.8 | LOS A | 4.7 | 35.3 | Full | 60 | 0.0 | 0.0 |
| Lane 3 | 510 | 7.6 | 473 | 7.3 | 815 | 0.580 | 100 | 3.7 | LOS A | 4.6 | 34.1 | Full | 60 | 0.0 | 0.0 |
| Lane 4 | 71 | 2.8 | 66 | 2.7 | 210 | 0.314 | 100 | 57.1 | LOS E | 3.8 | 27.2 | Short | 20 | 0.0 | NA |
| Approach | 1602 | 7.4 | 1484 [N1] | 7.1 | | 0.580 | | 7.3 | LOS A | 8.6 | 64.0 | | | | |
| NorthEast: William Roberts Road Extension | | | | | | | | | | | | | | | |
| Lane 1 | 52 | 7.7 | 52 | 7.7 | 304 | 0.171 | 100 | 59.0 | LOS E | 3.3 | 24.3 | Short | 80 | 0.0 | NA |
| Lane 2 | 245 | 8.6 | 245 | 8.6 | 302 | 0.812 | 100 | 71.7 | LOS E | 18.4 | 138.6 | Full | 110 | 0.0 | 26.0 |
| Approach | 297 | 8.4 | 297 | 8.4 | | 0.812 | | 69.4 | LOS E | 18.4 | 138.6 | | | | |
| NorthWest: Ti Rakau Drive (West) | | | | | | | | | | | | | | | |
| Lane 1 | 198 | 5.6 | 194 | 5.6 | 1125 | 0.172 | 100 | 16.5 | LOS B | 5.7 | 41.7 | Full | 107 | 0.0 | 0.0 |
| Lane 2 | 449 | 5.4 | 440 | 5.4 | 1012 | 0.435 | 100 | 11.3 | LOS B | 10.5 | 77.0 | Full | 107 | 0.0 | 0.0 |
| Lane 3 | 335 | 5.4 | 328 | 5.4 | 753 [1] | 0.435 | 100 | 10.5 | LOS B | 7.2 | 53.1 | Full | 107 | 0.0 | 0.0 |
| Lane 4 | 179 | 0.6 | 175 | 0.6 | 199 [1] | 0.881 | 100 | 77.6 | LOS E | 13.4 | 94.2 | Short | 20 | 0.0 | NA |
| Approach | 1161 | 4.7 | 1138 [N1] | 4.7 | | 0.881 | | 22.2 | LOS C | 13.4 | 94.2 | | | | |
| Intersection | 3060 | 6.4 | 2918 [N1] | 6.8 | | 0.881 | | 19.4 | LOS B | 18.4 | 138.6 | | | | |
| **Site: 7.0 [7.0 Mattson Rd/ Ti Rakau Dr C]** | | | | | | | | | | | | | | | |
| SouthEast: Ti Rakau Drive (East) | | | | | | | | | | | | | | | |
| Lane 1 | 131 | 8.0 | 121 | 7.5 | 133 [1] | 0.904 | 100 | 75.4 | LOS E | 8.8 | 65.6 | Short | 25 | -7.2 [N3] | NA |
| Lane 2 | 665 | 6.6 | 614 | 6.3 | 679 [1] | 0.904 | 100 | 52.7 | LOS D | 31.6 [N4] | 233.4 [N4] | Full | 143 | 0.0 | 50.0 |
| Lane 3 | 795 | 8.1 | 734 | 7.9 | 812 | 0.904 | 100 | 53.4 | LOS D | 31.2 [N4] | 233.4 [N4] | Full | 143 | 0.0 | 50.0 |
| Approach | 1591 | 7.5 | 1468 [N1] | 7.2 | | 0.904 | | 54.9 | LOS D | 31.6 | 233.4 | | | | |
| NorthWest: Ti Rakau Drive (West) | | | | | | | | | | | | | | | |
| Lane 1 | 433 | 3.5 | 424 | 3.5 | 1505 | 0.282 | 100 | 1.3 | LOS A | 2.2 | 16.0 | Full | 60 | 0.0 | 0.0 |
| Lane 2 | 422 | 7.3 | 414 | 7.5 | 1468 | 0.282 | 100 | 1.5 | LOS A | 2.5 | 18.9 | Full | 60 | 0.0 | 0.0 |
| Approach | 855 | 5.4 | 838 [N1] | 5.4 | | 0.282 | | 1.4 | LOS A | 2.5 | 18.9 | | | | |
| SouthWest: Mattson Road | | | | | | | | | | | | | | | |
| Lane 1 | 28 | 5.0 | 28 | 5.0 | 276 | 0.103 | 100 | 60.9 | LOS E | 1.7 | 12.7 | Full | 282 | -10.8 [N3] | 0.0 |
| Lane 2 | 32 | 5.0 | 32 | 5.0 | 309 | 0.103 | 100 | 60.7 | LOS E | 2.0 | 14.2 | Full | 282 | 0.0 | 0.0 |
| Approach | 60 | 5.0 | 60 | 5.0 | | 0.103 | | 60.8 | LOS E | 2.0 | 14.2 | | | | |
| Intersection | 2506 | 6.7 | 2366 [N1] | 7.1 | | 0.904 | | 36.1 | LOS D | 31.6 | 233.4 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.
N3 Capacity Adjustment due to downstream lane blockage determined by the program.
N4 Average back of queue has been restricted to the available queue storage space.

## Approach Lane Flows (CCG) (veh/h)

Site: 6.5 [6.5 William Roberts Rd / Ti Rakau Dr C]

SouthEast: Ti Rakau Drive (East)

| Mov. From SE To Exit: | T1 NW | R2 NE | U SE | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 473 | - | - | 473 | 7.3 | 815 | 0.580 | 100 | NA | NA |
| Lane 2 | 473 | - | - | 473 | 7.3 | 815 | 0.580 | 100 | NA | NA |
| Lane 3 | 473 | - | - | 473 | 7.3 | 815 | 0.580 | 100 | NA | NA |
| Lane 4 | - | 47 | 19 | 66 | 2.7 | 210 | 0.314 | 100 | 33.0 | 3 |
| Approach | 1418 | 47 | 19 | 1484 | 7.1 | | 0.580 | | | |

NorthEast: William Roberts Road Extension

| Mov. From NE To Exit: | L2 SE | R2 NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 52 | - | 52 | 7.7 | 304 | 0.171 | 100 | 0.0 | 2 |
| Lane 2 | - | 245 | 245 | 8.6 | 302 | 0.812 | 100 | NA | NA |
| Approach | 52 | 245 | 297 | 8.4 | | 0.812 | | | |

NorthWest: Ti Rakau Drive (West)

| Mov. From NW To Exit: | L2 NE | T1 SE | U NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 194 | - | - | 194 | 5.6 | 1125 | 0.172 | 100 | NA | NA |
| Lane 2 | - | 440 | - | 440 | 5.4 | 1012 | 0.435 | 100 | NA | NA |
| Lane 3 | - | 328 | - | 328 | 5.4 | 753[1] | 0.435 | 100 | NA | NA |
| Lane 4 | - | - | 175 | 175 | 0.6 | 199[1] | 0.881 | 100 | 100.0 | 3 |
| Approach | 194 | 768 | 175 | 1138 | 4.7 | | 0.881 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 2918 | 6.8 | 0.881 |

Site: 7.0 [7.0 Mattson Rd/ Ti Rakau Dr C]

SouthEast: Ti Rakau Drive (East)

| Mov. From SE To Exit: | L2 SW | T1 NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 45 | 76 | 121 | 7.5 | 133[1] | 0.904 | 100 | 96.1 | 2 |
| Lane 2 | - | 614 | 614 | 6.3 | 679[1] | 0.904 | 100 | NA | NA |
| Lane 3 | - | 734 | 734 | 7.9 | 812 | 0.904 | 100 | NA | NA |
| Approach | 45 | 1423 | 1468 | 7.2 | | 0.904 | | | |

NorthWest: Ti Rakau Drive (West)

| Mov. From | T1 | Total | %HV | Cap. | Deg. Satn | Lane Util. | Prob. SL Ov. | Ov. Lane |
|---|---|---|---|---|---|---|---|---|

| NW To Exit: | SE | | | | veh/h | v/c | % | % | No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 424 | 424 | 3.5 | | 1505 | 0.282 | 100 | NA | NA |
| Lane 2 | 414 | 414 | 7.5 | | 1468 | 0.282 | 100 | NA | NA |
| Approach | 838 | 838 | 5.4 | | | 0.282 | | | |
| SouthWest: Mattson Road | | | | | | | | | |
| Mov. From SW To Exit: | L2 NW | Total | %HV | | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 28 | 28 | 5.0 | | 276 | 0.103 | 100 | NA | NA |
| Lane 2 | 32 | 32 | 5.0 | | 309 | 0.103 | 100 | NA | NA |
| Approach | 60 | 60 | 5.0 | | | 0.103 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 2366 | 7.1 | 0.904 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

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

**Merge Analysis (CCG)**

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Site: 6.5 [6.5 William Roberts Rd / Ti Rakau Dr C] | | | | | | | | | | | |
| SouthEast Exit: Ti Rakau Drive (East)<br>Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | |
| NorthEast Exit: William Roberts Road Extension<br>Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| NorthWest Exit: Ti Rakau Drive (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | |
| Site: 7.0 [7.0 Mattson Rd/ Ti Rakau Dr C] | | | | | | | | | | | |
| SouthEast Exit: Ti Rakau Drive (East)<br>Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | |
| NorthWest Exit: Ti Rakau Drive (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | |
| SouthWest Exit: Mattson Road<br>Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |

# LANE SUMMARY

## Site: 10.0 [10.0 Edgewater Dr (West) / Chevis Pl (Site Folder: General)]

## Network: N101 [Construction 1 (Network Folder: AM)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated    Cycle Time = 90 seconds (Site Practical Cycle Time)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total | HV ] | ARRIVAL FLOWS [ Total | HV ] | Cap. | Deg. Satn | Lane Util. | Aver. Delay | Level of Service | 95% BACK OF QUEUE [ Veh | Dist ] | Lane Config | Lane Length | Cap. Adj. | Prob. Block. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | veh/h | % | veh/h | % | veh/h | v/c | % | sec | | | m | | m | % | % |
| **SouthEast: Ti Rakau Drive (East)** | | | | | | | | | | | | | | | |
| Lane 1 | 697 | 9.7 | 691 | 9.7 | 819 | 0.844 | 100 | 30.3 | LOS C | 30.5 | 231.4 | Full | 162 | 0.0 | 37.6 |
| Lane 2 | 678 | 10.5 | 672 | 10.6 | 796[1] | 0.844 | 100 | 30.2 | LOS C | 29.7 | 226.5 | Full | 162 | 0.0 | 35.6 |
| Lane 3 | 10 | 0.0 | 10 | 0.0 | 119 | 0.084 | 100 | 49.4 | LOS D | 0.4 | 3.0 | Short | 22 | 0.0 | NA |
| Approach | 1385 | 10.0 | 1373[N1] | 10.1 | | 0.844 | | 30.4 | LOS C | 30.5 | 231.4 | | | | |
| **NorthEast: Chevis Place** | | | | | | | | | | | | | | | |
| Lane 1 | 46 | 2.2 | 46 | 2.2 | 123 | 0.373 | 100 | 50.1 | LOS D | 2.1 | 14.8 | Full | 138 | 0.0 | 0.0 |
| Approach | 46 | 2.2 | 46 | 2.2 | | 0.373 | | 50.1 | LOS D | 2.1 | 14.8 | | | | |
| **NorthWest: Ti Rakau Drive (West)** | | | | | | | | | | | | | | | |
| Lane 1 | 530 | 12.5 | 494 | 12.7 | 821 | 0.601 | 100 | 20.5 | LOS C | 14.3[N4] | 111.0[N4] | Full | 68 | 0.0 | 50.0 |
| Lane 2 | 461 | 12.7 | 429 | 12.9 | 713[1] | 0.601 | 100 | 19.9 | LOS B | 13.9 | 108.2 | Full | 68 | 0.0 | 47.6 |
| Lane 3 | 47 | 12.8 | 44 | 12.8 | 113 | 0.387 | 100 | 51.5 | LOS D | 2.0 | 15.5 | Short | 25 | 0.0 | NA |
| Approach | 1038 | 12.6 | 966[N1] | 12.8 | | 0.601 | | 21.6 | LOS C | 14.3 | 111.0 | | | | |
| **SouthWest: Edgewater Drive (West)** | | | | | | | | | | | | | | | |
| Lane 1 | 117 | 8.5 | 117 | 8.5 | 743 | 0.157 | 100 | 13.0 | LOS B | 2.2 | 16.8 | Short | 42 | 0.0 | NA |
| Lane 2 | 41 | 4.9 | 41 | 4.9 | 281 | 0.146 | 100 | 39.7 | LOS D | 1.6 | 11.6 | Full | 789 | 0.0 | 0.0 |
| Approach | 158 | 7.6 | 158 | 7.6 | | 0.157 | | 19.9 | LOS B | 2.2 | 16.8 | | | | |
| Intersection | 2627 | 10.8 | 2544[N1] | 11.1 | | 0.844 | | 26.7 | LOS C | 30.5 | 231.4 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.
N4 Average back of queue has been restricted to the available queue storage space.

**Approach Lane Flows (veh/h)**

SouthEast: Ti Rakau Drive (East)

| Mov. From SE To Exit: | L2 SW | T1 NW | R2 NE | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 94 | 597 | - | 691 | 9.7 | 819 | 0.844 | 100 | NA | NA |
| Lane 2 | - | 672 | - | 672 | 10.6 | 796[1] | 0.844 | 100 | NA | NA |
| Lane 3 | - | - | 10 | 10 | 0.0 | 119 | 0.084 | 100 | 0.0 | 2 |
| Approach | 94 | 1269 | 10 | 1373 | 10.1 | | 0.844 | | | |

NorthEast: Chevis Place

| Mov. From NE To Exit: | L2 SE | T1 SW | R2 NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 19 | 10 | 17 | 46 | 2.2 | 123 | 0.373 | 100 | NA | NA |
| Approach | 19 | 10 | 17 | 46 | 2.2 | | 0.373 | | | |

NorthWest: Ti Rakau Drive (West)

| Mov. From NW To Exit: | L2 NE | T1 SE | R2 SW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 9 | 484 | - | 494 | 12.7 | 821 | 0.601 | 100 | NA | NA |
| Lane 2 | - | 429 | - | 429 | 12.9 | 713[1] | 0.601 | 100 | NA | NA |
| Lane 3 | - | - | 44 | 44 | 12.8 | 113 | 0.387 | 100 | 0.0 | 2 |
| Approach | 9 | 913 | 44 | 966 | 12.8 | | 0.601 | | | |

SouthWest: Edgewater Drive (West)

| Mov. From SW To Exit: | L2 NW | T1 NE | R2 SE | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 117 | - | - | 117 | 8.5 | 743 | 0.157 | 100 | 0.0 | 2 |
| Lane 2 | - | 10 | 31 | 41 | 4.9 | 281 | 0.146 | 100 | NA | NA |
| Approach | 117 | 10 | 31 | 158 | 7.6 | | 0.157 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 2544 | 11.1 | 0.844 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

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

**Merge Analysis**

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast Exit: Ti Rakau Drive (East)<br>Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | |
| NorthEast Exit: Chevis Place<br>Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| NorthWest Exit: Ti Rakau Drive (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | |
| SouthWest Exit: Edgewater Drive (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |

# LANE SUMMARY

## Site: 10.0 [10.0 Edgewater Dr (West) / Chevis Pl (Site Folder: General)]

## Network: N101 [Construction 1 (Network Folder: PM)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated    Cycle Time = 100 seconds (Site Practical Cycle Time)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total | HV ] | ARRIVAL FLOWS [ Total | HV ] | Cap. | Deg. Satn | Lane Util. | Aver. Delay | Level of Service | 95% BACK OF QUEUE [ Veh | Dist ] | Lane Config | Lane Length | Cap. Adj. | Prob. Block. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | veh/h | % | veh/h | % | veh/h | v/c | % | sec | | | m | | m | % | % |
| **SouthEast: Ti Rakau Drive (East)** | | | | | | | | | | | | | | | |
| Lane 1 | 825 | 6.9 | 816 | 6.9 | 915 | 0.892 | 100 | 36.3 | LOS D | 35.6 [N4] | 264.4 [N4] | Full | 162 | 0.0 | 50.0 |
| Lane 2 | 809 | 7.2 | 801 | 7.3 | 897 [1] | 0.892 | 100 | 36.3 | LOS D | 35.6 [N4] | 264.4 [N4] | Full | 162 | 0.0 | 50.0 |
| Lane 3 | 10 | 0.0 | 10 | 0.0 | 107 | 0.093 | 100 | 55.1 | LOS E | 0.5 | 3.4 | Short | 22 | 0.0 | NA |
| Approach | 1644 | 7.0 | 1627 [N1] | 7.1 | | 0.892 | | 36.4 | LOS D | 35.6 | 264.4 | | | | |
| **NorthEast: Chevis Place** | | | | | | | | | | | | | | | |
| Lane 1 | 30 | 0.0 | 30 | 0.0 | 113 | 0.265 | 100 | 54.6 | LOS D | 1.5 | 10.4 | Full | 138 | 0.0 | 0.0 |
| Approach | 30 | 0.0 | 30 | 0.0 | | 0.265 | | 54.6 | LOS D | 1.5 | 10.4 | | | | |
| **NorthWest: Ti Rakau Drive (West)** | | | | | | | | | | | | | | | |
| Lane 1 | 418 | 7.4 | 381 | 6.3 | 941 | 0.405 | 100 | 17.4 | LOS B | 11.7 | 86.5 | Full | 68 | 0.0 | 26.9 |
| Lane 2 | 356 | 7.6 | 324 | 6.5 | 800 [1] | 0.405 | 100 | 16.9 | LOS B | 9.7 | 72.0 | Full | 68 | 0.0 | 10.1 |
| Lane 3 | 46 | 6.5 | 42 | 4.9 | 107 | 0.389 | 100 | 57.0 | LOS E | 2.1 | 15.4 | Short | 25 | 0.0 | NA |
| Approach | 820 | 7.4 | 747 [N1] | 6.3 | | 0.405 | | 19.4 | LOS B | 11.7 | 86.5 | | | | |
| **SouthWest: Edgewater Drive (West)** | | | | | | | | | | | | | | | |
| Lane 1 | 87 | 6.9 | 87 | 6.9 | 676 | 0.129 | 100 | 16.1 | LOS B | 2.0 | 15.1 | Short | 42 | 0.0 | NA |
| Lane 2 | 51 | 3.9 | 51 | 3.9 | 272 | 0.187 | 100 | 44.7 | LOS D | 2.2 | 16.1 | Full | 789 | 0.0 | 0.0 |
| Approach | 138 | 5.8 | 138 | 5.8 | | 0.187 | | 26.7 | LOS C | 2.2 | 16.1 | | | | |
| Intersection | 2632 | 7.0 | 2542 [N1] | 7.2 | | 0.892 | | 31.1 | LOS C | 35.6 | 264.4 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.
N4 Average back of queue has been restricted to the available queue storage space.

**Approach Lane Flows (veh/h)**

SouthEast: Ti Rakau Drive (East)

| Mov. From SE To Exit: | L2 SW | T1 NW | R2 NE | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 92 | 724 | - | 816 | 6.9 | 915 | 0.892 | 100 | NA | NA |
| Lane 2 | - | 801 | - | 801 | 7.3 | 897 [1] | 0.892 | 100 | NA | NA |
| Lane 3 | - | - | 10 | 10 | 0.0 | 107 | 0.093 | 100 | 0.0 | 2 |
| Approach | 92 | 1525 | 10 | 1627 | 7.1 | | 0.892 | | | |

NorthEast: Chevis Place

| Mov. From NE To Exit: | L2 SE | T1 SW | R2 NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 10 | 10 | 10 | 30 | 0.0 | 113 | 0.265 | 100 | NA | NA |
| Approach | 10 | 10 | 10 | 30 | 0.0 | | 0.265 | | | |
| **NorthWest: Ti Rakau Drive (West)** | | | | | | | | | | |
| Mov. From NW To Exit: | L2 NE | T1 SE | R2 SW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 9 | 372 | - | 381 | 6.3 | 941 | 0.405 | 100 | NA | NA |
| Lane 2 | - | 324 | - | 324 | 6.5 | 800 [1] | 0.405 | 100 | NA | NA |
| Lane 3 | - | - | 42 | 42 | 4.9 | 107 | 0.389 | 100 | 0.0 | 2 |
| Approach | 9 | 696 | 42 | 747 | 6.3 | | 0.405 | | | |
| **SouthWest: Edgewater Drive (West)** | | | | | | | | | | |
| Mov. From SW To Exit: | L2 NW | T1 NE | R2 SE | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 87 | - | - | 87 | 6.9 | 676 | 0.129 | 100 | 0.0 | 2 |
| Lane 2 | - | 10 | 41 | 51 | 3.9 | 272 | 0.187 | 100 | NA | NA |
| Approach | 87 | 10 | 41 | 138 | 5.8 | | 0.187 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 2542 | 7.2 | 0.892 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

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

## Merge Analysis

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | Opposing Flow Rate pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast Exit: Ti Rakau Drive (East)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| NorthEast Exit: Chevis Place<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| NorthWest Exit: Ti Rakau Drive (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| SouthWest Exit: Edgewater Drive (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |

# LANE SUMMARY

## Site: 13.0 [13.0 Gossamer Dr / Ti Rakau Dr Mitigation 2 (Site Folder: General)]

## Network: N101 [Construction 1 (Network Folder: AM)]

Scheme Design
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated    Cycle Time = 110 seconds (Site Practical Cycle Time)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Fremantle Place | | | | | | | | | | | | | | | |
| Lane 1 | 18 | 5.6 | 18 | 5.6 | 96 | 0.188 | 100 | 61.6 | LOS E | 1.0 | 7.2 | Short | 26 | 0.0 | NA |
| Lane 2 | 26 | 3.8 | 26 | 3.8 | 100 | 0.259 | 100 | 60.1 | LOS E | 1.4 | 10.3 | Full | 285 | 0.0 | 0.0 |
| Approach | 44 | 4.5 | 44 | 4.5 | | 0.259 | | 60.8 | LOS E | 1.4 | 10.3 | | | | |
| East: Ti Rakau Drive (East) | | | | | | | | | | | | | | | |
| Lane 1 | 624 | 10.2 | 624 | 10.2 | 824 | 0.758 | 100 | 26.8 | LOS C | 27.6 | 210.2 | Full | 636 | 0.0 | 0.0 |
| Lane 2 | 610 | 10.4 | 610 | 10.4 | 804 | 0.758 | 100 | 26.8 | LOS C | 27.1 | 206.8 | Full | 636 | 0.0 | 0.0 |
| Lane 3 | 168 | 11.0 | 168 | 11.0 | 339 | 0.496 | 57[6] | 27.0 | LOS C | 4.3 | 33.2 | Short | 150 | 0.0 | NA |
| Lane 4 | 296 | 11.0 | 296 | 11.0 | 339 | 0.873 | 100 | 39.2 | LOS D | 10.5 | 80.5 | Short | 103 | 0.0 | NA |
| Approach | 1698 | 10.5 | 1698 | 10.5 | | 0.873 | | 29.0 | LOS C | 27.6 | 210.2 | | | | |
| North: Gossamer Drive | | | | | | | | | | | | | | | |
| Lane 1 | 393 | 7.6 | 393 | 7.6 | 741 | 0.530 | 100 | 19.7 | LOS B | 11.2 | 83.6 | Short | 150 | 0.0 | NA |
| Lane 2 | 393 | 7.6 | 393 | 7.6 | 741 | 0.530 | 100 | 19.7 | LOS B | 11.2 | 83.6 | Full | 1010 | 0.0 | 0.0 |
| Lane 3 | 132 | 7.6 | 132 | 7.6 | 301 | 0.439 | 100 | 49.2 | LOS D | 6.5 | 48.4 | Short | 100 | 0.0 | NA |
| Approach | 917 | 7.6 | 917 | 7.6 | | 0.530 | | 23.9 | LOS C | 11.2 | 83.6 | | | | |
| West: Ti Rakau Drive (West) | | | | | | | | | | | | | | | |
| Lane 1 | 516 | 12.2 | 481 | 12.4 | 541 | 0.888 | 100 | 54.4 | LOS D | 29.0 | 224.9 | Full | 479 | 0.0 | 0.0 |
| Lane 2 | 496 | 12.3 | 461 | 12.5 | 519[1] | 0.888 | 100 | 52.2 | LOS D | 28.0 | 216.6 | Full | 479 | 0.0 | 0.0 |
| Lane 3 | 10 | 0.0 | 9 | 0.0 | 180 | 0.052 | 100 | 53.8 | LOS D | 0.5 | 3.2 | Short | 27 | 0.0 | NA |
| Approach | 1022 | 12.1 | 951[N1] | 12.3 | | 0.888 | | 53.3 | LOS D | 29.0 | 224.9 | | | | |
| Intersection | 3681 | 10.2 | 3610[N1] | 10.4 | | 0.888 | | 34.5 | LOS C | 29.0 | 224.9 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
6 Lane under-utilisation due to downstream effects
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

**Approach Lane Flows (veh/h)**

South: Fremantle Place

| Mov. From S To Exit: | L2 W | T1 N | R2 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 18 | - | - | 18 | 5.6 | 96 | 0.188 | 100 | 0.0 | 2 |
| Lane 2 | - | 10 | 16 | 26 | 3.8 | 100 | 0.259 | 100 | NA | NA |
| Approach | 18 | 10 | 16 | 44 | 4.5 | | 0.259 | | | |

| East: Ti Rakau Drive (East) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Mov. From E To Exit: | L2 S | T1 W | R2 N | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 19 | 605 | - | 624 | 10.2 | 824 | 0.758 | 100 | NA | NA |
| Lane 2 | - | 610 | - | 610 | 10.4 | 804 | 0.758 | 100 | NA | NA |
| Lane 3 | - | - | 168 | 168 | 11.0 | 339 | 0.496 | 57[6] | 0.0 | 2 |
| Lane 4 | - | - | 296 | 296 | 11.0 | 339 | 0.873 | 100 | 0.0 | 3 |
| Approach | 19 | 1215 | 464 | 1698 | 10.5 | | 0.873 | | | |
| **North: Gossamer Drive** | | | | | | | | | | |
| Mov. From N To Exit: | L2 E | T1 S | R2 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 393 | - | - | 393 | 7.6 | 741 | 0.530 | 100 | 0.0 | 2 |
| Lane 2 | 393 | - | - | 393 | 7.6 | 741 | 0.530 | 100 | NA | NA |
| Lane 3 | - | 10 | 122 | 132 | 7.6 | 301 | 0.439 | 100 | 0.0 | 2 |
| Approach | 785 | 10 | 122 | 917 | 7.6 | | 0.530 | | | |
| **West: Ti Rakau Drive (West)** | | | | | | | | | | |
| Mov. From W To Exit: | L2 N | T1 E | R2 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 18 | 463 | - | 481 | 12.4 | 541 | 0.888 | 100 | NA | NA |
| Lane 2 | - | 461 | - | 461 | 12.5 | 519[1] | 0.888 | 100 | NA | NA |
| Lane 3 | - | - | 9 | 9 | 0.0 | 180 | 0.052 | 100 | 0.0 | 2 |
| Approach | 18 | 924 | 9 | 951 | 12.3 | | 0.888 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 3610 | 10.4 | 0.888 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

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

6 Lane under-utilisation due to downstream effects

## Merge Analysis

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South Exit: Fremantle Place<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| East Exit: Ti Rakau Drive (East)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| North Exit: Gossamer Drive<br>Merge Type: **Zipper** | | | | | | | | | | | | |
| Exit Short Lane | 1 | 100 | 50.0 | 153 | 161 | 2.50 | 2.00 | 186 | 1612 | 0.115 | 0.0 | 0.1 |
| Merge Lane | 2 | - | 50.0 | 93 | 98 | 2.50 | 2.00 | 306 | 1689 | 0.181 | 0.0 | 0.0 |
| West Exit: Ti Rakau Drive (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |

# LANE SUMMARY

## Site: 13.0 [13.0 Gossamer Dr / Ti Rakau Dr Mitigation 2 (Site Folder: General)]

## Network: N101 [Construction 1 (Network Folder: PM)]

Scheme Design
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated    Cycle Time = 154 seconds (Site User-Given Phase Times)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **South: Fremantle Place** | | | | | | | | | | | | | | | |
| Lane 1 | 12 | 8.3 | 12 | 8.3 | 112 | 0.107 | 100 | 80.0 | LOS E | 0.9 | 6.6 | Short | 26 | 0.0 | NA |
| Lane 2 | 27 | 3.7 | 27 | 3.7 | 120 | 0.226 | 100 | 79.2 | LOS E | 2.0 | 14.4 | Full | 285 | 0.0 | 0.0 |
| Approach | 39 | 5.1 | 39 | 5.1 | | 0.226 | | 79.4 | LOS E | 2.0 | 14.4 | | | | |
| **East: Ti Rakau Drive (East)** | | | | | | | | | | | | | | | |
| Lane 1 | 879 | 7.1 | 879 | 7.1 | 1007 | 0.873 | 100 | 35.1 | LOS D | 58.4 | 433.8 | Full | 636 | 0.0 | 0.0 |
| Lane 2 | 745 | 7.1 | 745 | 7.1 | 854 [1] | 0.873 | 100 | 34.9 | LOS C | 46.6 | 346.0 | Full | 636 | 0.0 | 0.0 |
| Lane 3 | 245 | 8.0 | 245 | 8.0 | 539 | 0.455 | 57 [6] | 28.2 | LOS C | 7.8 | 58.6 | Short | 150 | 0.0 | NA |
| Lane 4 | 432 | 8.0 | 432 | 8.0 | 539 | 0.801 | 100 | 38.3 | LOS D | 19.1 | 142.6 | Short | 103 | 0.0 | NA |
| Approach | 2301 | 7.3 | 2301 | 7.3 | | 0.873 | | 34.9 | LOS C | 58.4 | 433.8 | | | | |
| **North: Gossamer Drive** | | | | | | | | | | | | | | | |
| Lane 1 | 200 | 14.5 | 200 | 14.5 | 828 | 0.241 | 100 | 18.8 | LOS B | 6.1 | 48.1 | Short | 150 | 0.0 | NA |
| Lane 2 | 200 | 14.5 | 200 | 14.5 | 828 | 0.241 | 100 | 18.8 | LOS B | 6.1 | 48.1 | Full | 1010 | 0.0 | 0.0 |
| Lane 3 | 47 | 8.5 | 47 | 8.5 | 260 | 0.180 | 100 | 65.7 | LOS E | 3.1 | 23.3 | Short | 100 | 0.0 | NA |
| Approach | 446 | 13.9 | 446 | 13.9 | | 0.241 | | 23.7 | LOS C | 6.1 | 48.1 | | | | |
| **West: Ti Rakau Drive (West)** | | | | | | | | | | | | | | | |
| Lane 1 | 411 | 7.2 | 372 | 6.2 | 539 | 0.690 | 100 | 53.5 | LOS D | 23.9 | 176.5 | Full | 479 | 0.0 | 0.0 |
| Lane 2 | 387 | 8.1 | 350 | 7.0 | 508 [1] | 0.690 | 100 | 52.2 | LOS D | 23.2 | 172.1 | Full | 479 | 0.0 | 0.0 |
| Lane 3 | 10 | 0.0 | 9 | 0.0 | 164 | 0.056 | 100 | 74.2 | LOS E | 0.6 | 4.5 | Short | 27 | 0.0 | NA |
| Approach | 808 | 7.5 | 731 [N1] | 6.5 | | 0.690 | | 53.1 | LOS D | 23.9 | 176.5 | | | | |
| Intersection | 3594 | 8.2 | 3517 [N1] | 8.4 | | 0.873 | | 37.8 | LOS D | 58.4 | 433.8 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
6 Lane under-utilisation due to downstream effects
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

**Approach Lane Flows (veh/h)**

South: Fremantle Place

| Mov. From S To Exit: | L2 W | T1 N | R2 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 12 | - | - | 12 | 8.3 | 112 | 0.107 | 100 | 0.0 | 2 |
| Lane 2 | - | 10 | 17 | 27 | 3.7 | 120 | 0.226 | 100 | NA | NA |
| Approach | 12 | 10 | 17 | 39 | 5.1 | | 0.226 | | | |

| East: Ti Rakau Drive (East) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Mov. From E To Exit: | L2 S | T1 W | R2 N | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 20 | 859 | - | 879 | 7.1 | 1007 | 0.873 | 100 | NA | NA |
| Lane 2 | - | 745 | - | 745 | 7.1 | 854[1] | 0.873 | 100 | NA | NA |
| Lane 3 | - | - | 245 | 245 | 8.0 | 539 | 0.455 | 57[6] | 0.5 | 2 |
| Lane 4 | - | - | 432 | 432 | 8.0 | 539 | 0.801 | 100 | 34.7 | 3 |
| Approach | 20 | 1604 | 677 | 2301 | 7.3 | | 0.873 | | | |

| North: Gossamer Drive | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Mov. From N To Exit: | L2 E | T1 S | R2 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 200 | - | - | 200 | 14.5 | 828 | 0.241 | 100 | 0.0 | 2 |
| Lane 2 | 200 | - | - | 200 | 14.5 | 828 | 0.241 | 100 | NA | NA |
| Lane 3 | - | 10 | 37 | 47 | 8.5 | 260 | 0.180 | 100 | 0.0 | 2 |
| Approach | 399 | 10 | 37 | 446 | 13.9 | | 0.241 | | | |

| West: Ti Rakau Drive (West) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Mov. From W To Exit: | L2 N | T1 E | R2 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 50 | 322 | - | 372 | 6.2 | 539 | 0.690 | 100 | NA | NA |
| Lane 2 | - | 350 | - | 350 | 7.0 | 508[1] | 0.690 | 100 | NA | NA |
| Lane 3 | - | - | 9 | 9 | 0.0 | 164 | 0.056 | 100 | 0.0 | 2 |
| Approach | 50 | 672 | 9 | 731 | 6.5 | | 0.690 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 3517 | 8.4 | 0.873 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

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

6 Lane under-utilisation due to downstream effects

## Merge Analysis

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South Exit: Fremantle Place<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| East Exit: Ti Rakau Drive (East)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| North Exit: Gossamer Drive<br>Merge Type: **Zipper** | | | | | | | | | | | | |
| Exit Short Lane | 1 | 100 | 50.0 | 221 | 230 | 2.50 | 2.00 | 295 | 1525 | 0.194 | 0.0 | 0.1 |
| Merge Lane | 2 | - | 50.0 | 148 | 153 | 2.50 | 2.00 | 442 | 1623 | 0.272 | 0.0 | 0.1 |
| West Exit: Ti Rakau Drive (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |

# Appendix F

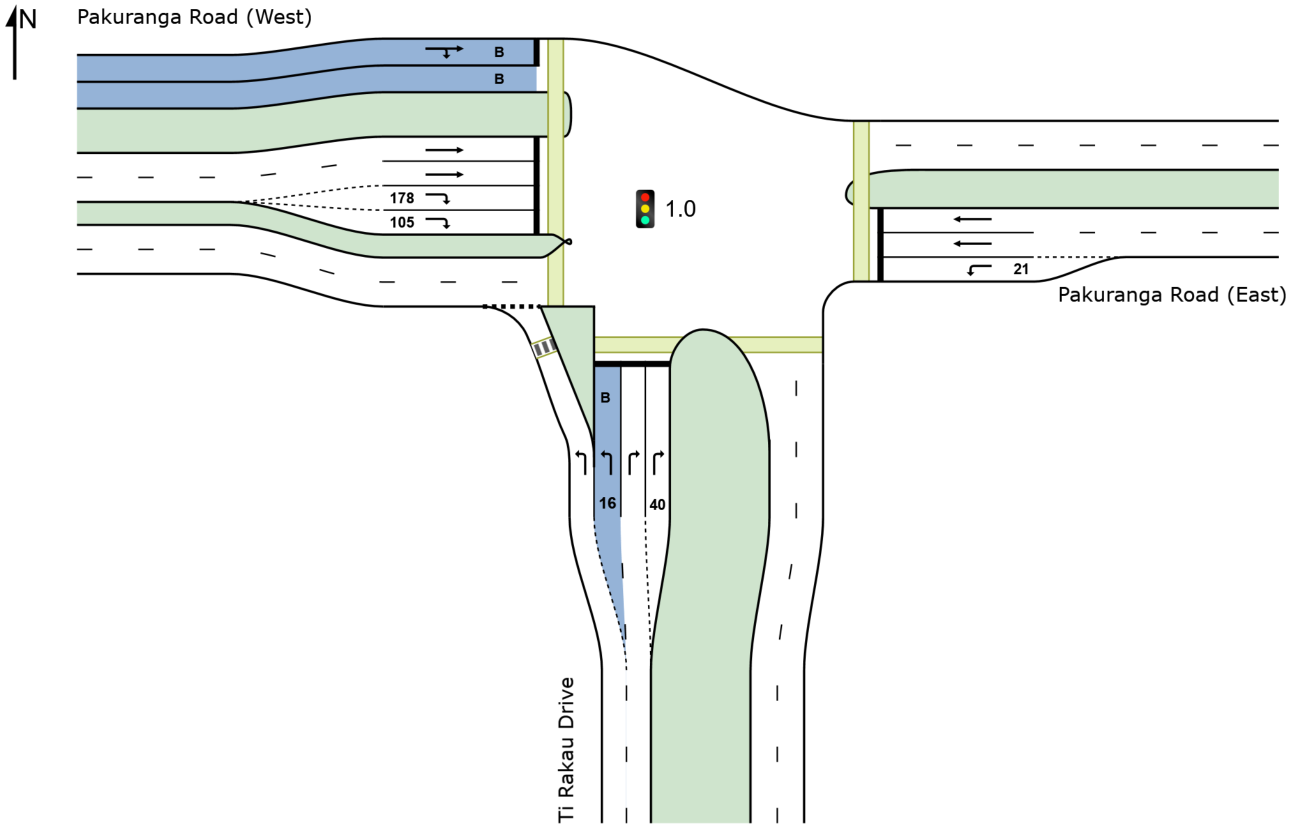
**Construction Scenario 2 – Phasing Diagrams**

# SITE LAYOUT

## Site: 1.0 [1.0 Pakuranga Rd / Ti Rakau Dr (Site Folder: AM)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated

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



# PHASING SUMMARY

## Site: 1.0 [1.0 Pakuranga Rd / Ti Rakau Dr (Site Folder: AM)]

## Network: N101 [AM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated    Cycle Time = 140 seconds (Site Practical Cycle Time)

**Timings based on settings in the Site Phasing & Timing dialog**
**Phase Times determined by the program**
**Downstream lane blockage effects included in determining phase times**
**Phase Sequence: Variable Phasing**
**Reference Phase: Phase B**
**Input Phase Sequence: A, B, Bus, D, E**
**Output Phase Sequence: A, B, Bus, D, E**

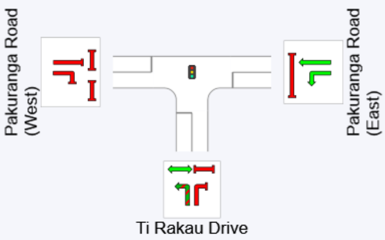
### Phase Timing Summary

| Phase | A | B | Bus | D | E |
|---|---|---|---|---|---|
| Phase Change Time (sec) | 113 | 0 | 45 | 57 | 84 |
| Green Time (sec) | 21 | 39 | 6 | 21 | 23 |
| Phase Time (sec) | 27 | 45 | 12 | 27 | 29 |
| Phase Split | 19% | 32% | 9% | 19% | 21% |

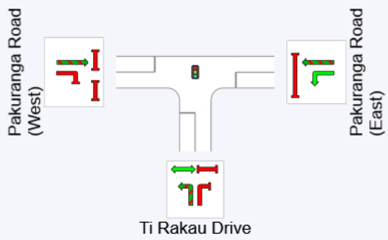
See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified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

### Output Phase Sequence

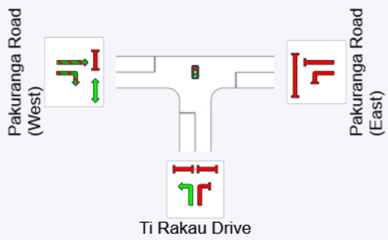
**Phase A**



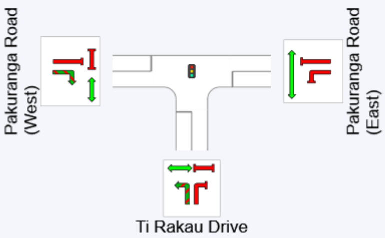

**Phase B** **REF**



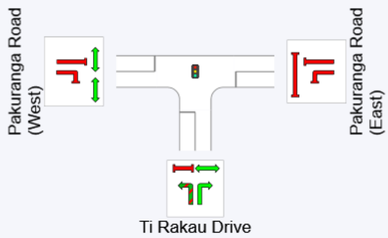

**Phase Bus**




**Phase D**




**Phase E**




REF: Reference Phase
VAR: Variable Phase

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

# PHASING SUMMARY

## Site: 1.0 [1.0 Pakuranga Rd / Ti Rakau Dr (Site Folder: PM)]

## Network: N101 [PM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated    Cycle Time = 130 seconds (Site User-Given Phase Times)

**Timings based on settings in the Site Phasing & Timing dialog**
**Phase Times specified by the user**
**Phase Sequence: Variable Phasing**
**Reference Phase: Phase A**
**Input Phase Sequence: B, A, D, Bus, E**
**Output Phase Sequence: B, A, D, Bus, E**

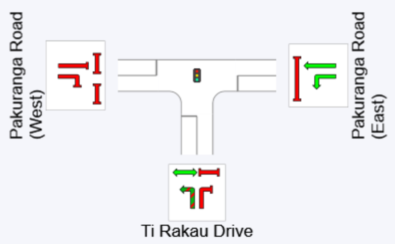
## Phase Timing Summary

| Phase | B | A | D | Bus | E |
|---|---|---|---|---|---|
| Phase Change Time (sec) | 123 | 0 | 70 | 95 | 109 |
| Green Time (sec) | 5 | 66 | 19 | 9 | 8 |
| Phase Time (sec) | 9 | 72 | 24 | 15 | 10 |
| Phase Split | 7% | 55% | 18% | 12% | 8% |

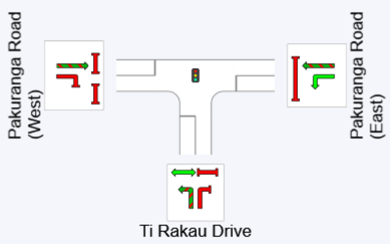
See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified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

## Output Phase Sequence

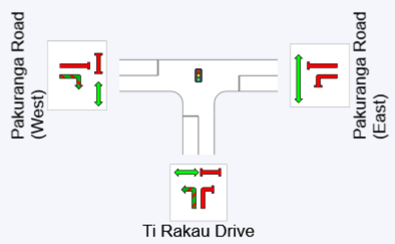
**Phase B**



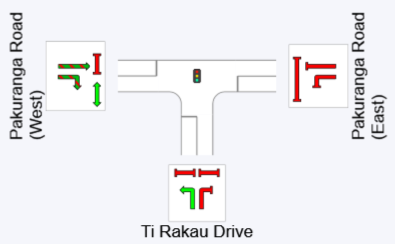

**Phase A** **REF**



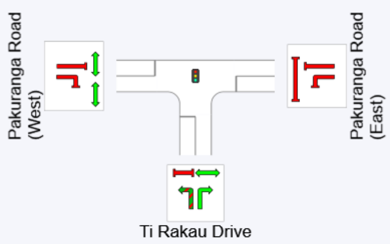

**Phase D**




**Phase Bus**




**Phase E**




REF: Reference Phase
VAR: Variable Phase

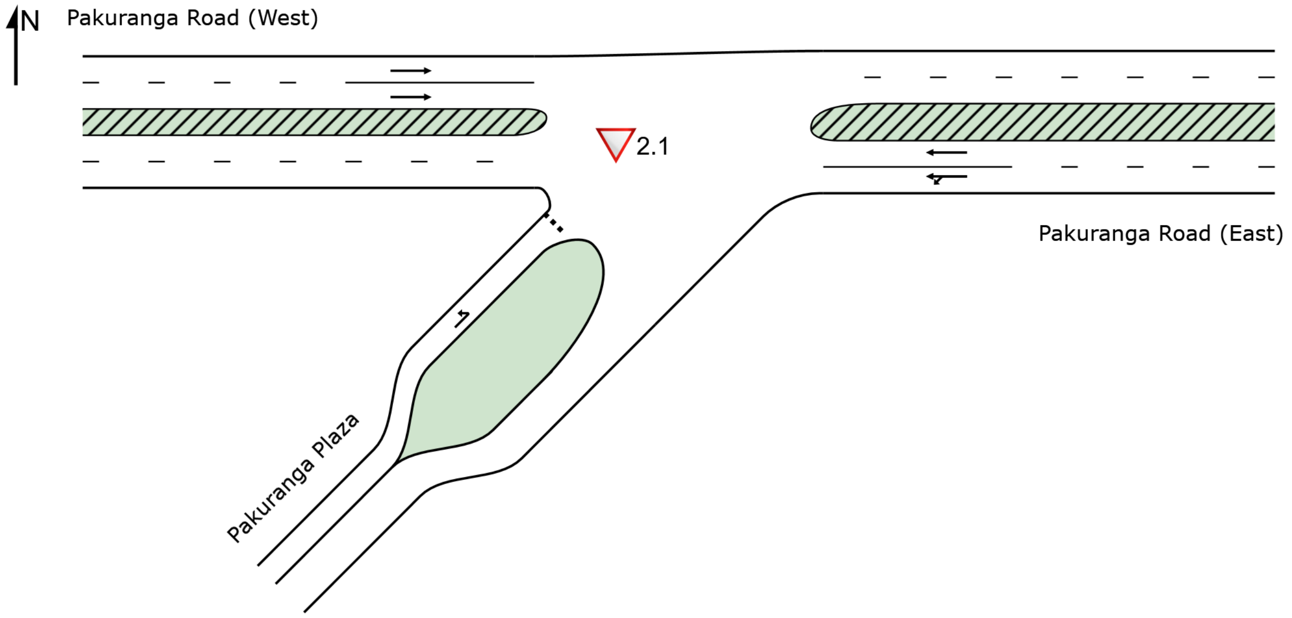
| | |
|---|---|
| Normal Movement | Permitted/Opposed |
| Slip/Bypass-Lane Movement | Opposed Slip/Bypass-Lane |
| Stopped Movement | Turn On Red |
| Other Movement Class (MC) Running | Undetected Movement |
| Mixed Running & Stopped MCs | Continuous Movement |
| Other Movement Class (MC) Stopped | Phase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

# SITE LAYOUT

## Site: 2.1 [2.1 Pakuranga Plaza / Pakuranga Rd (Site Folder: AM)]

Site Category: (None)
Give-Way (Two-Way)

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

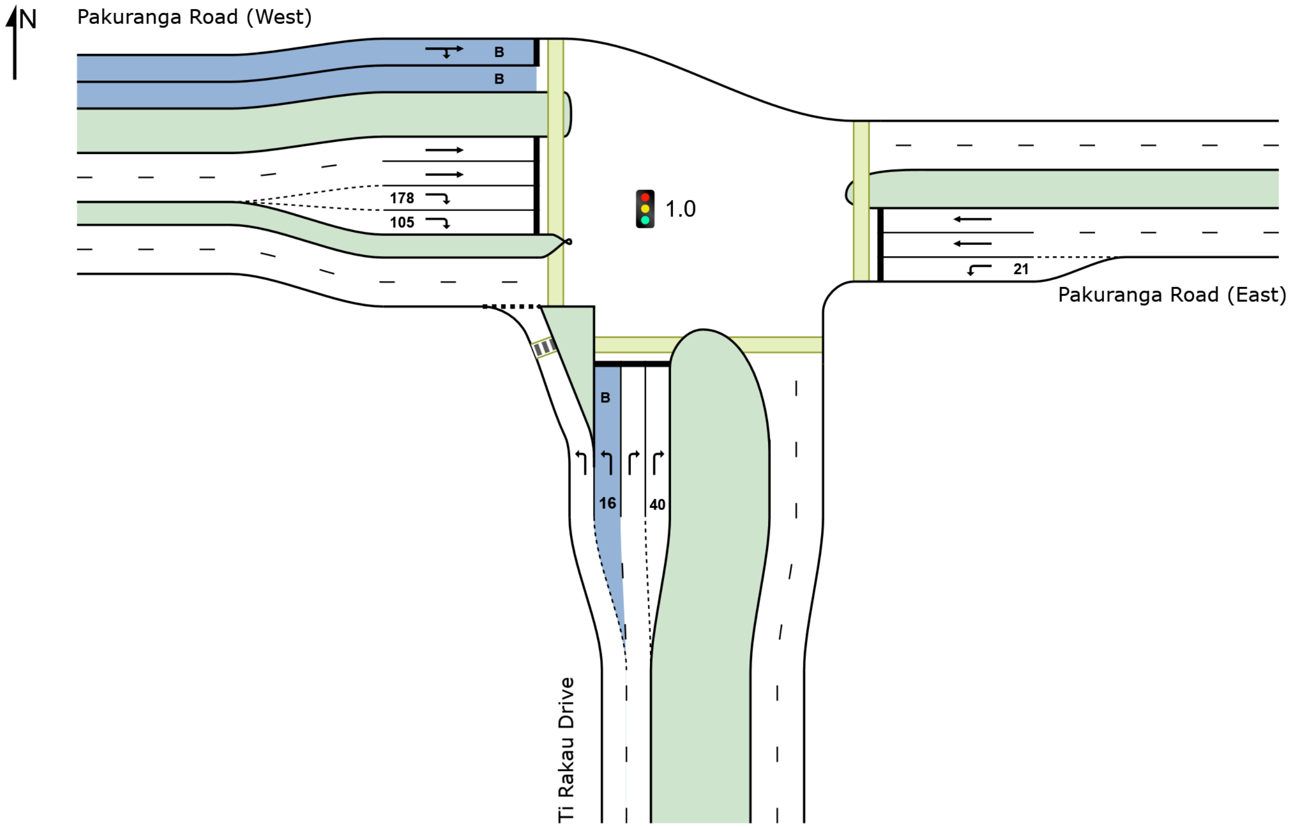


# SITE LAYOUT

## Site: 1.0 [1.0 Pakuranga Rd / Ti Rakau Dr (Site Folder: AM)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated

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

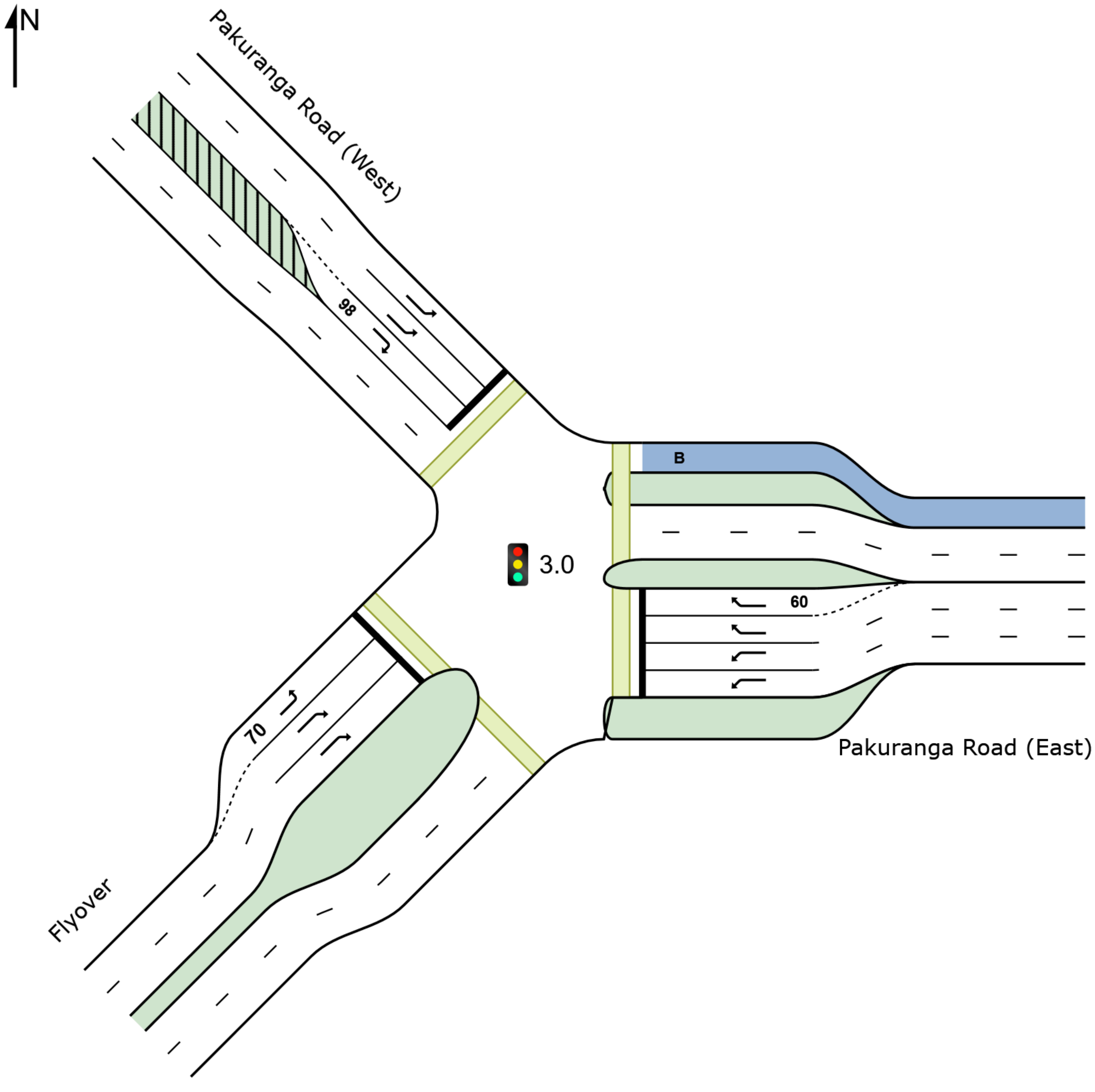


# SITE LAYOUT

## Site: 3.0 [3.0 Pakuranga Highway / Pakuranga Rd (Site Folder: AM)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated

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

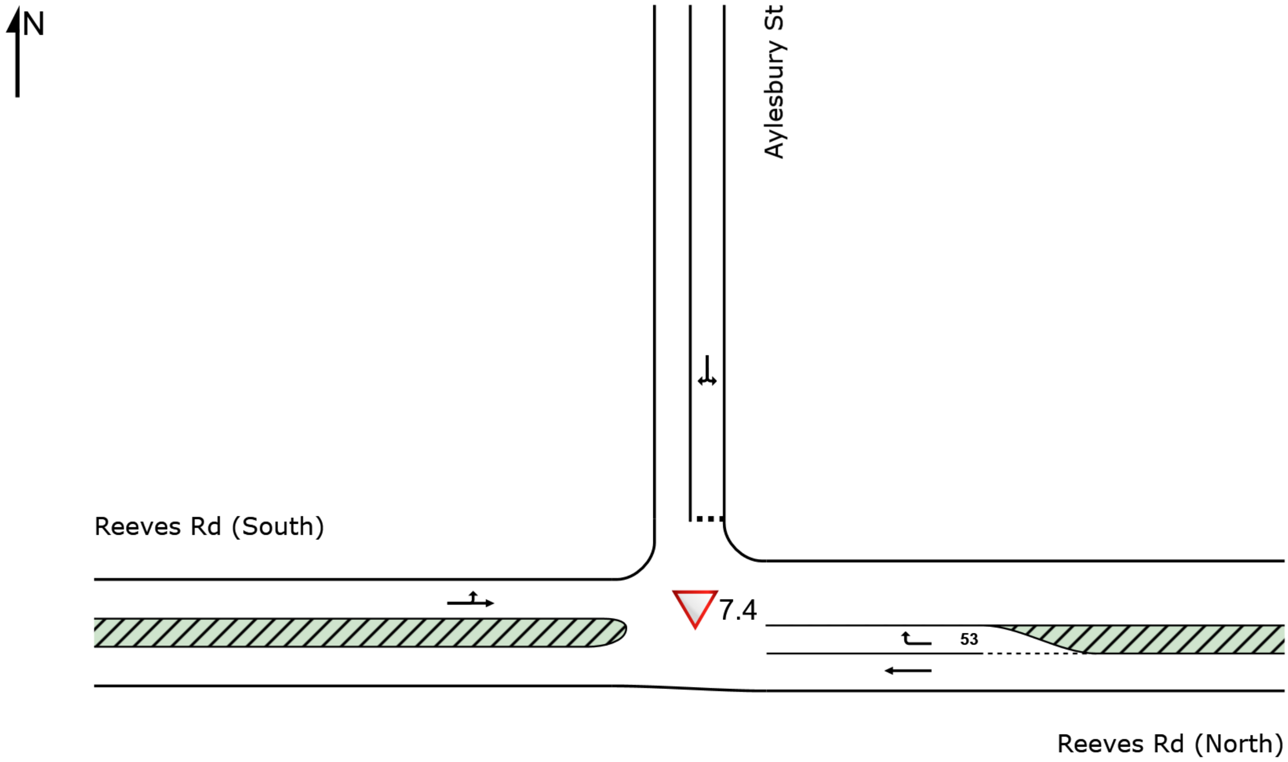


# SITE LAYOUT

## Site: 7.4 [7.4 Reeves Rd/ Aylesbury St - XL (Site Folder: AM)]

New Site
Site Category: (None)
Give-Way (Two-Way)

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

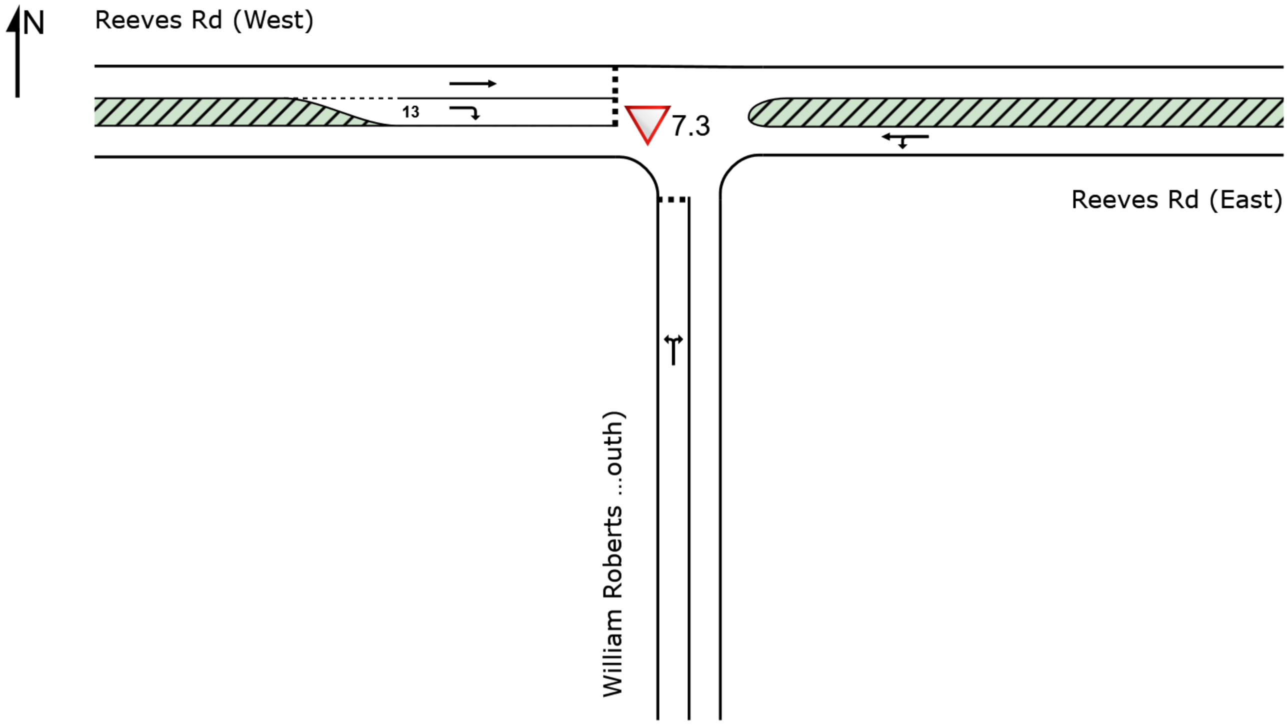


# SITE LAYOUT

## Site: 7.3 [7.3 William Roberts Rd / Reeves Rd - XL (Site Folder: AM)]

Site Category: (None)
Give-Way (Two-Way)

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

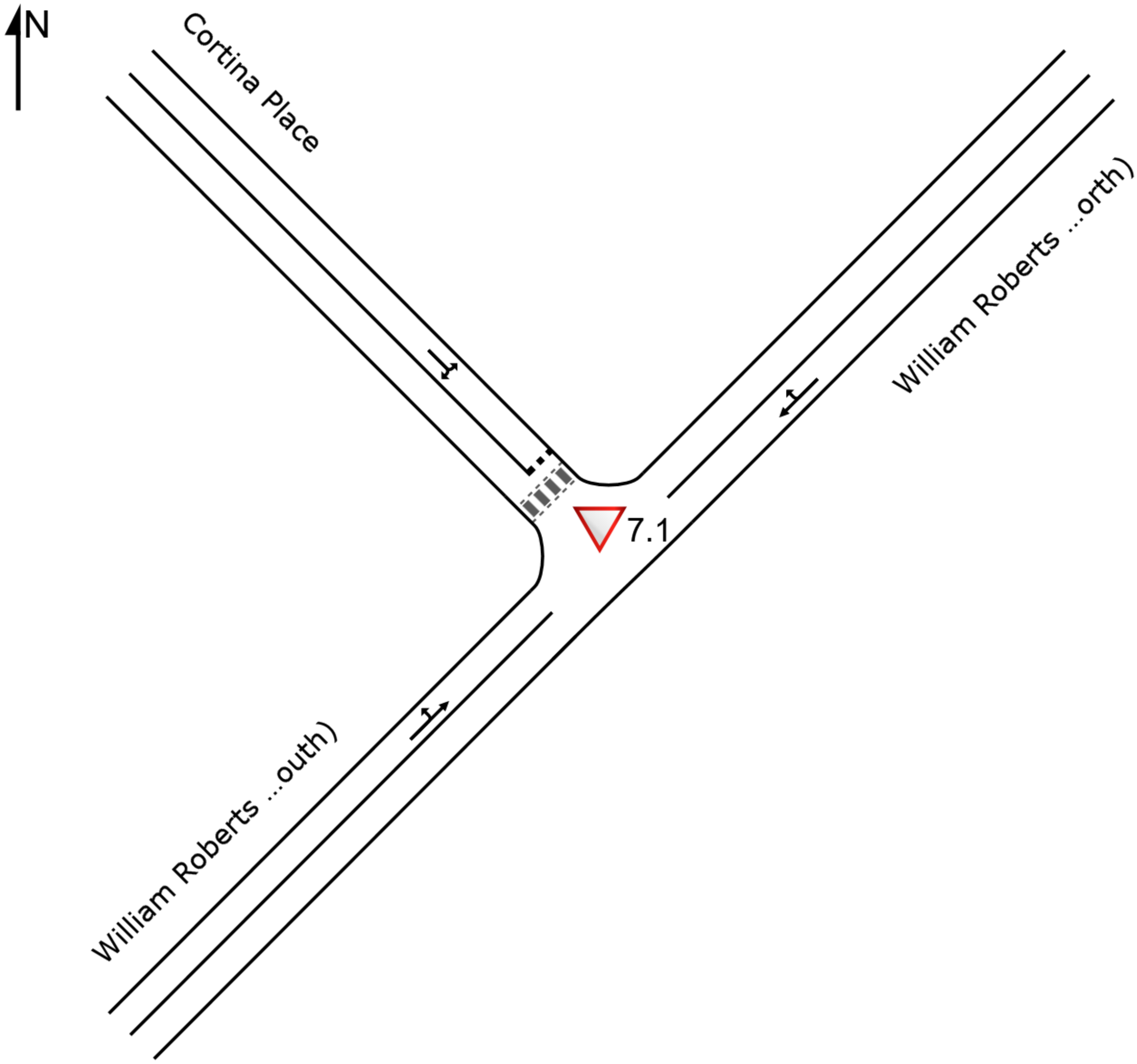


# SITE LAYOUT

## ▽ Site: 7.1 [7.1 William Roberts Rd / Cortina Pl (Site Folder: AM)]

Site Category: (None)
Give-Way (Two-Way)

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

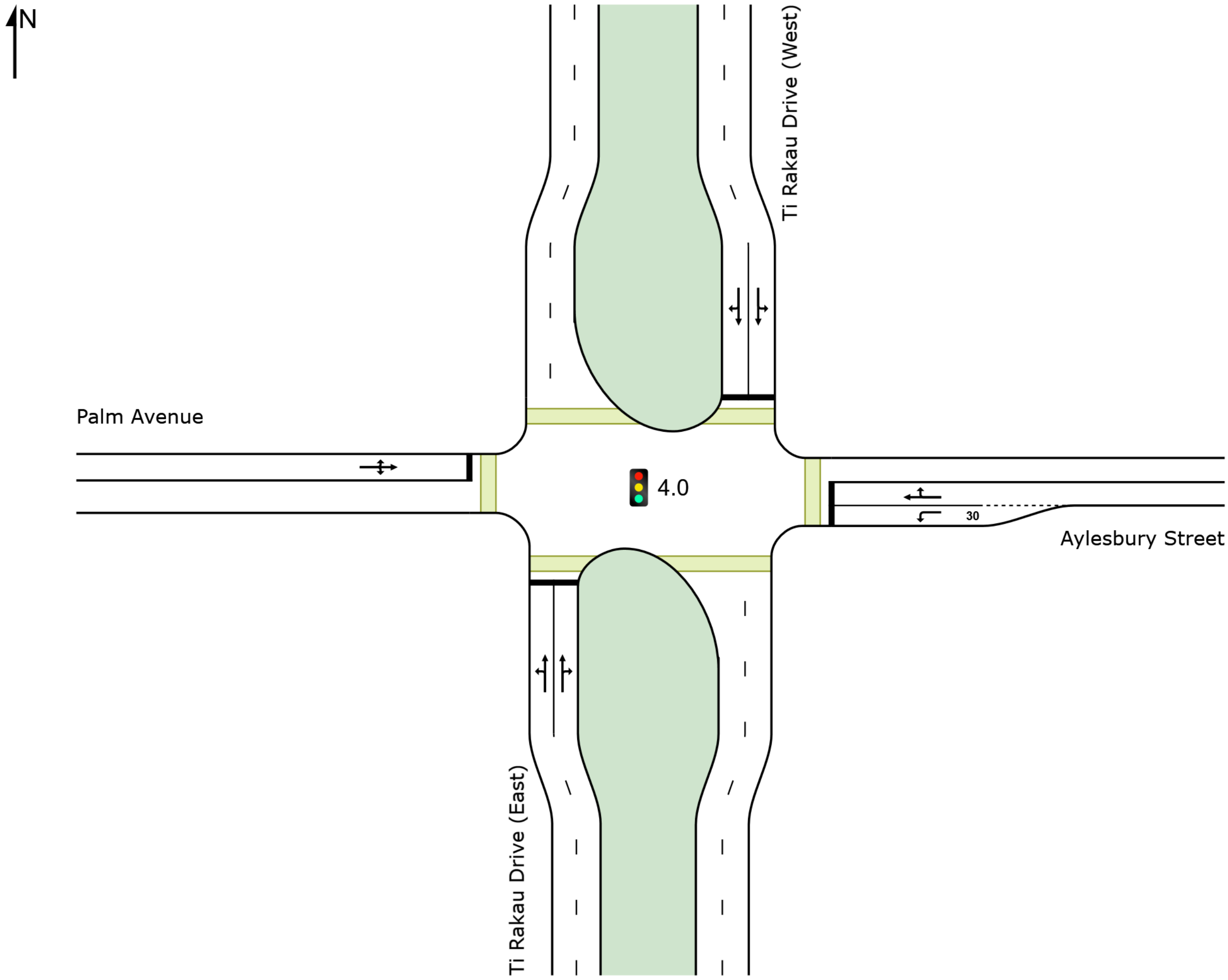


# SITE LAYOUT

## Site: 4.0 [4.0 Palm Ave / Aylesbury St (Site Folder: AM)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated

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

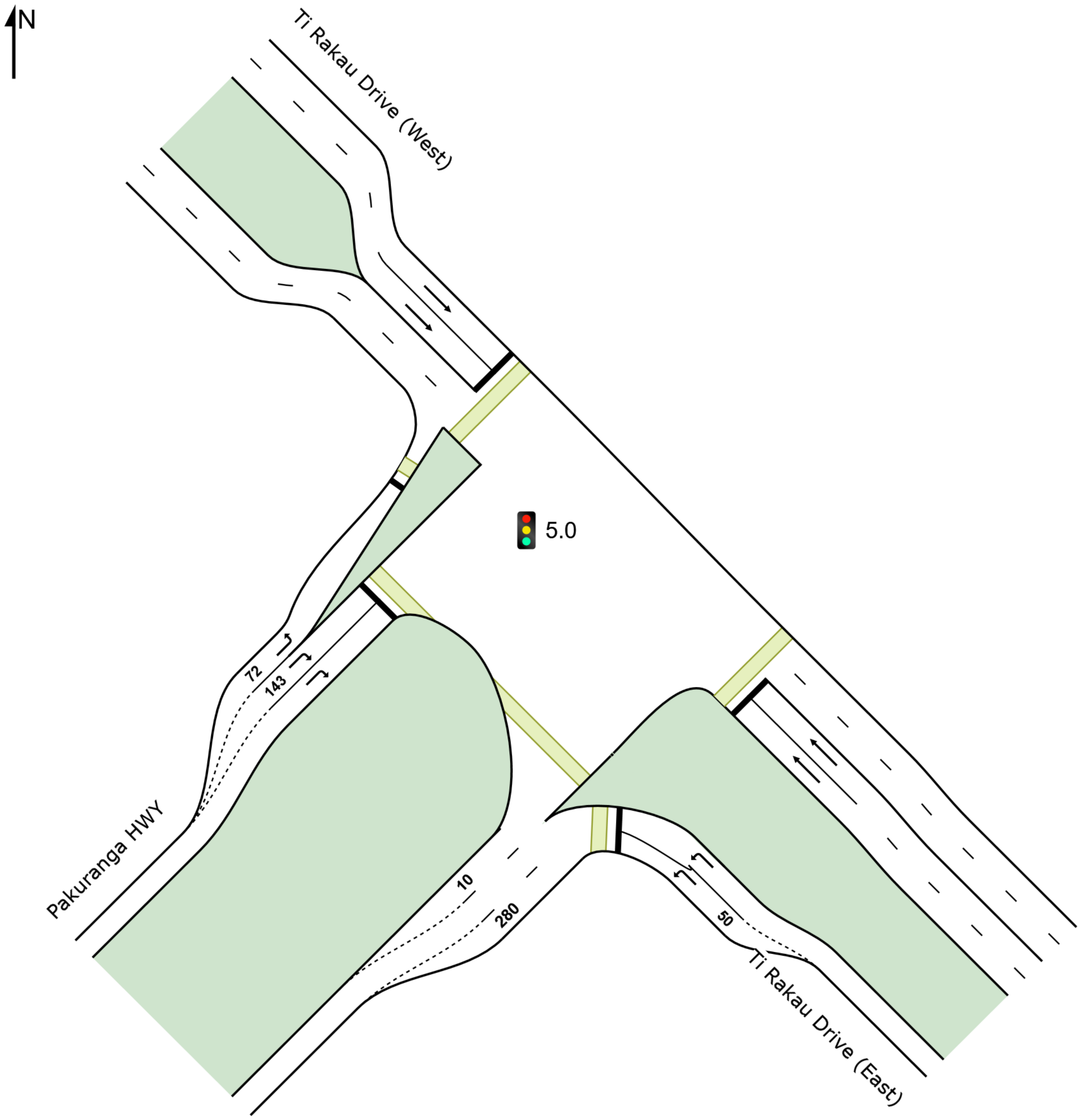


# SITE LAYOUT

## Site: 5.0 [5.0 Pakuranga Highway/ Reeves Rd (Site Folder: AM)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated

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

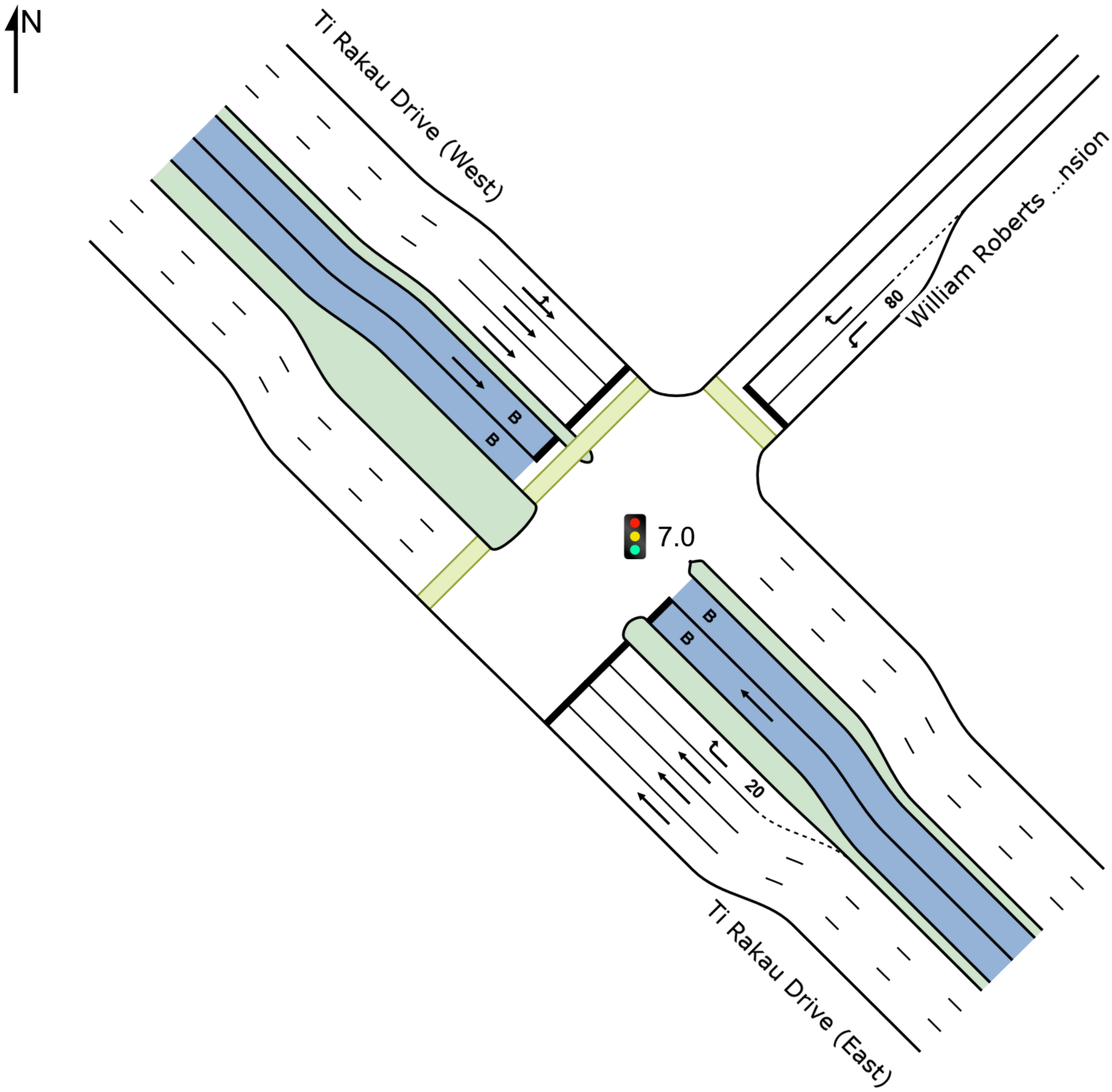


# SITE LAYOUT

## Site: 7.0 [7.0 William Roberts Rd / Ti Rakau Dr (Site Folder: AM)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated

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

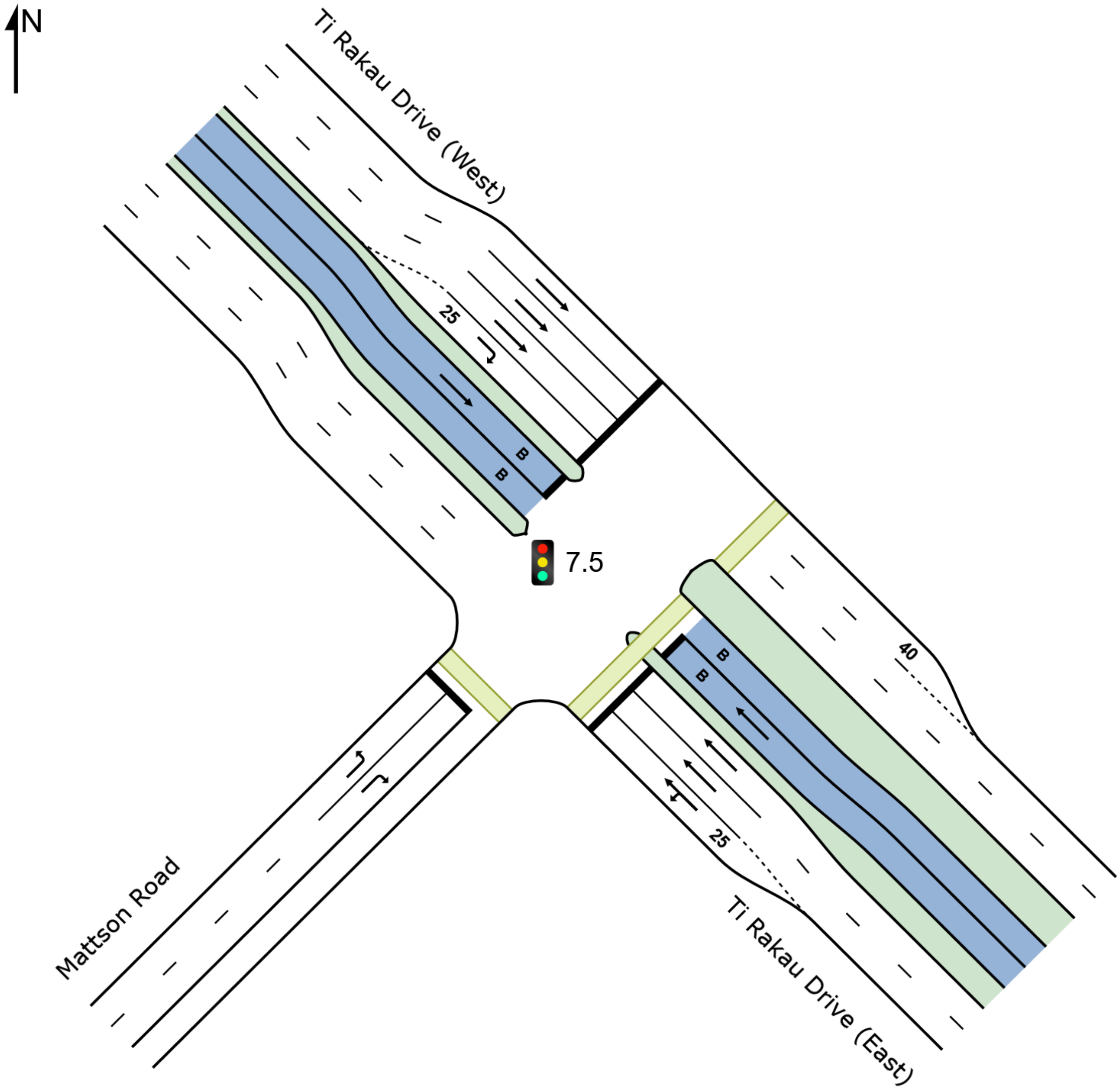


# SITE LAYOUT

## Site: 7.5 [7.5 Mattson Rd/ Ti Rakau Dr (Site Folder: AM)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated

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

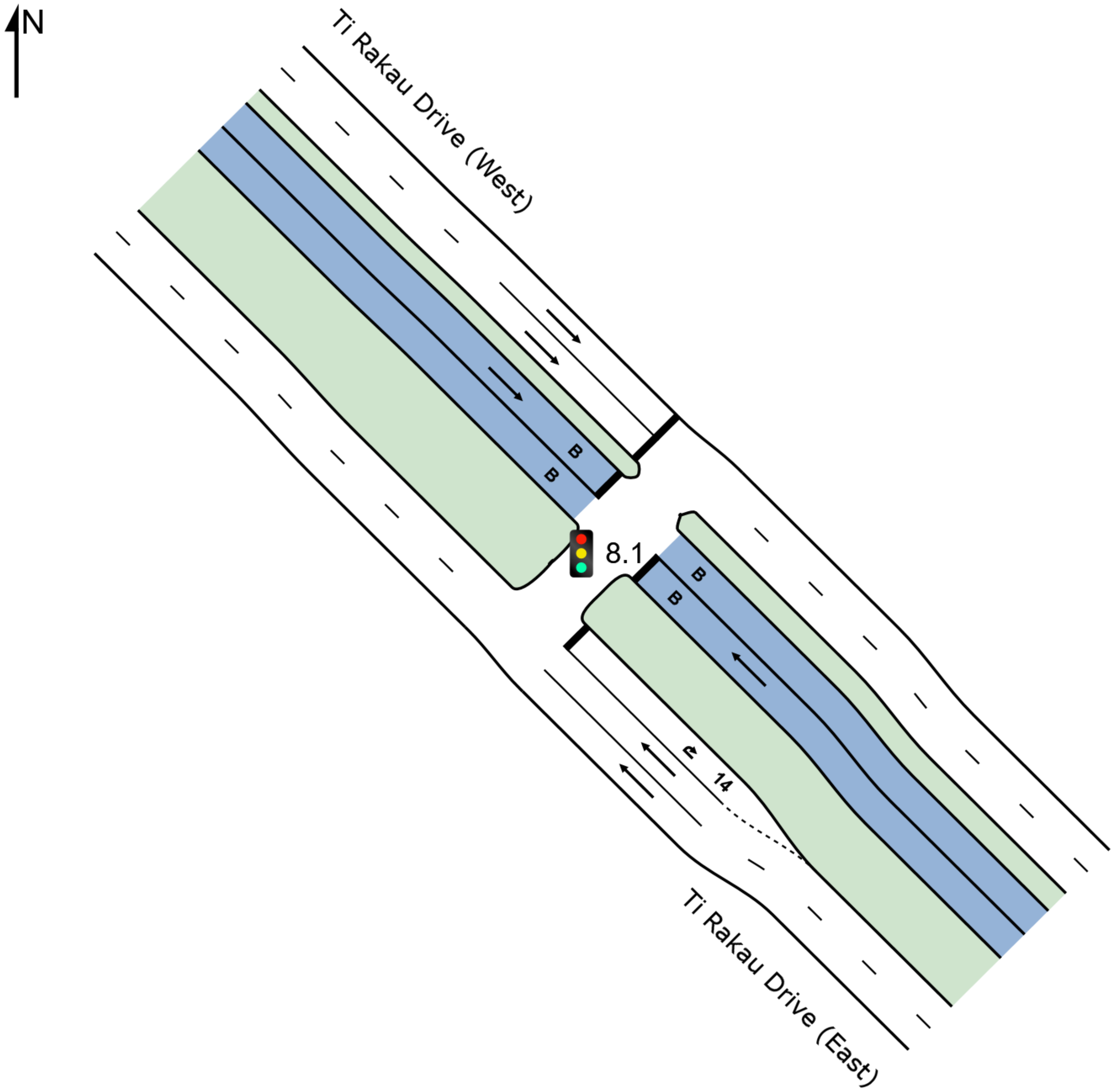


# SITE LAYOUT

## Site: 8.1 [8.1 U-turn - West of Marriot Rd (Site Folder: AM)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated

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

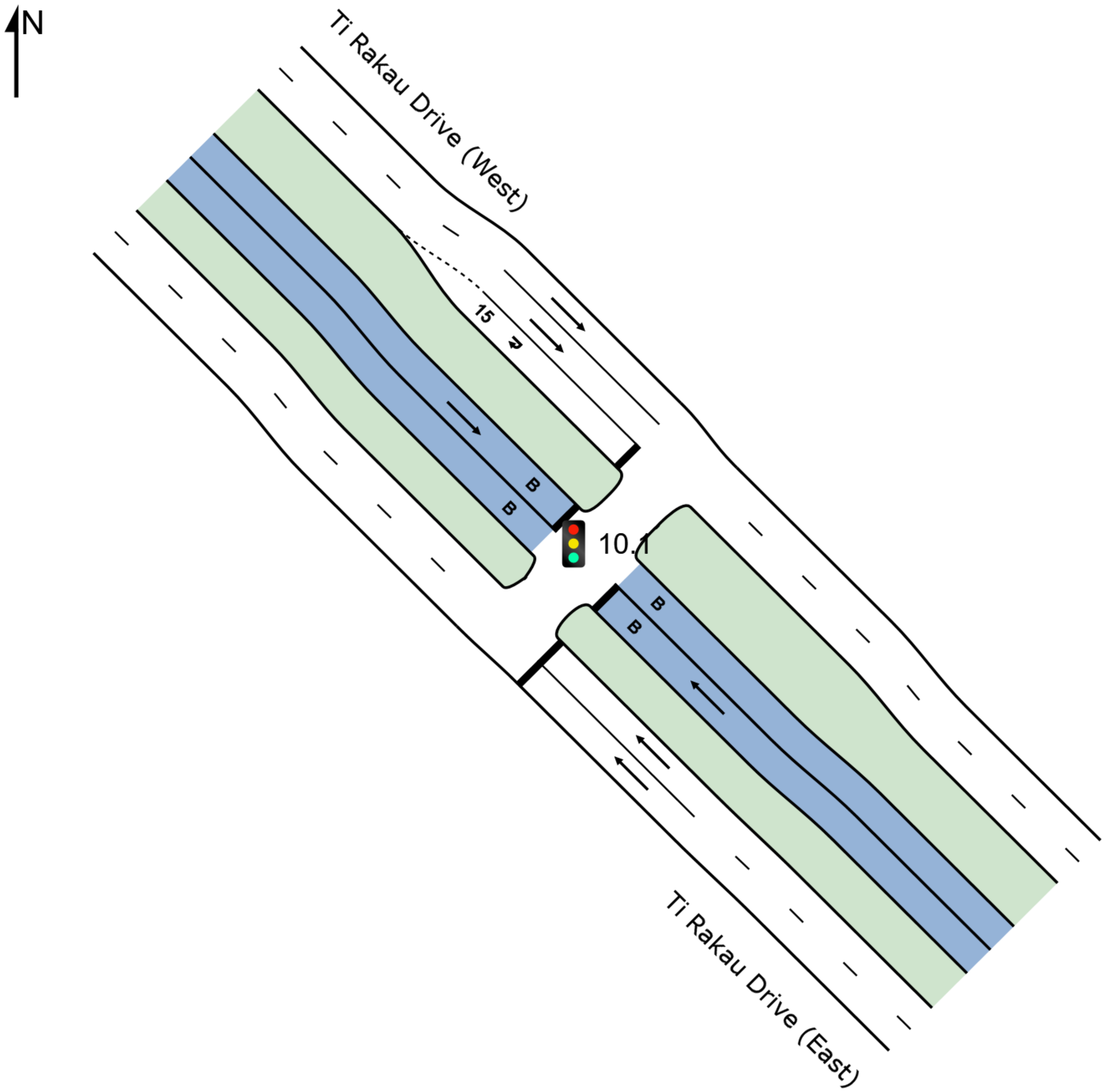


# SITE LAYOUT

## Site: 10.1 [10.1 U-turn - East of Edgewater Dr (West) (Site Folder: AM)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated

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

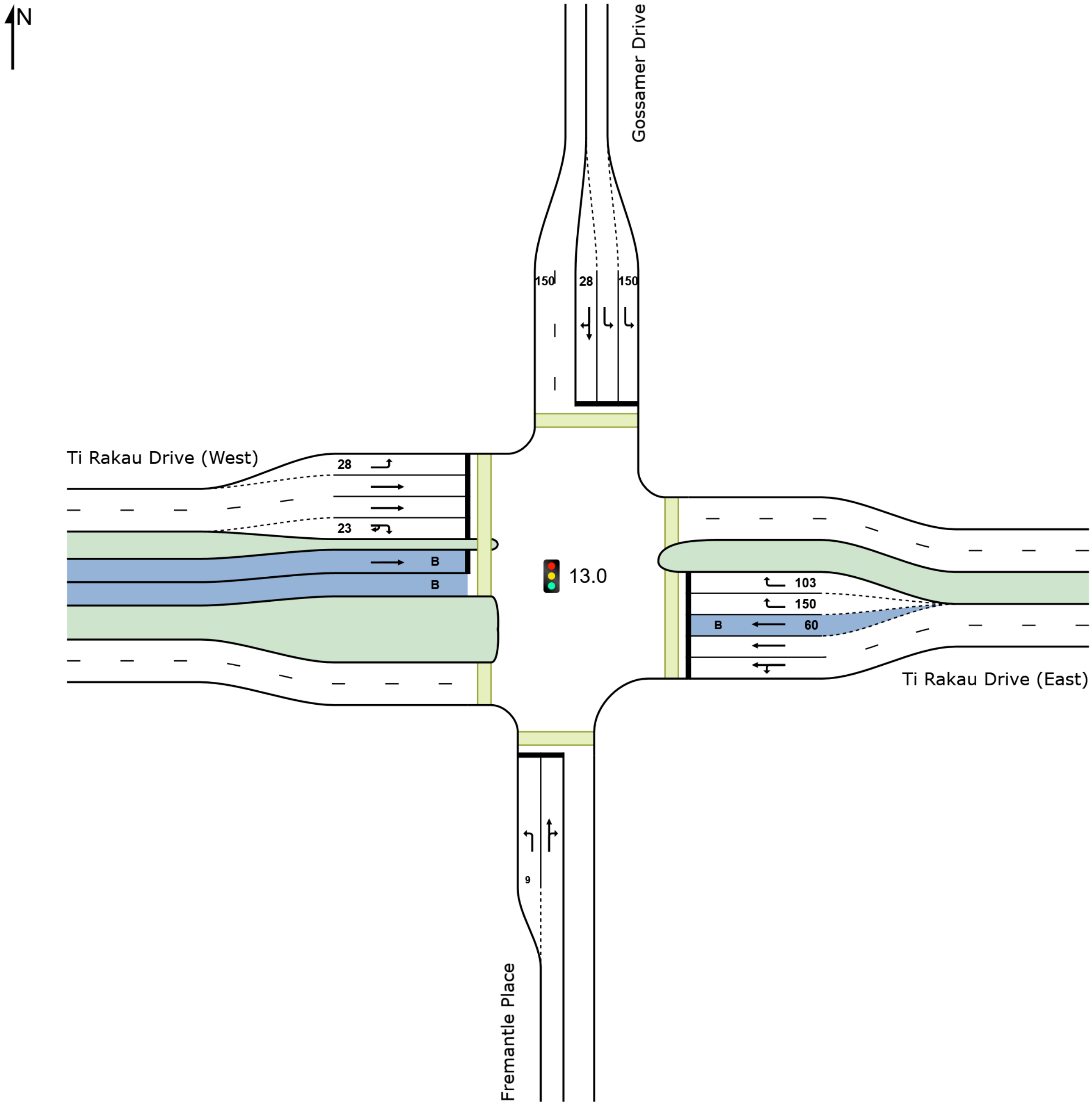


# SITE LAYOUT

## Site: 13.0 [13.0 Gossamer Dr / Ti Rakau Dr (Site Folder: AM)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated

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

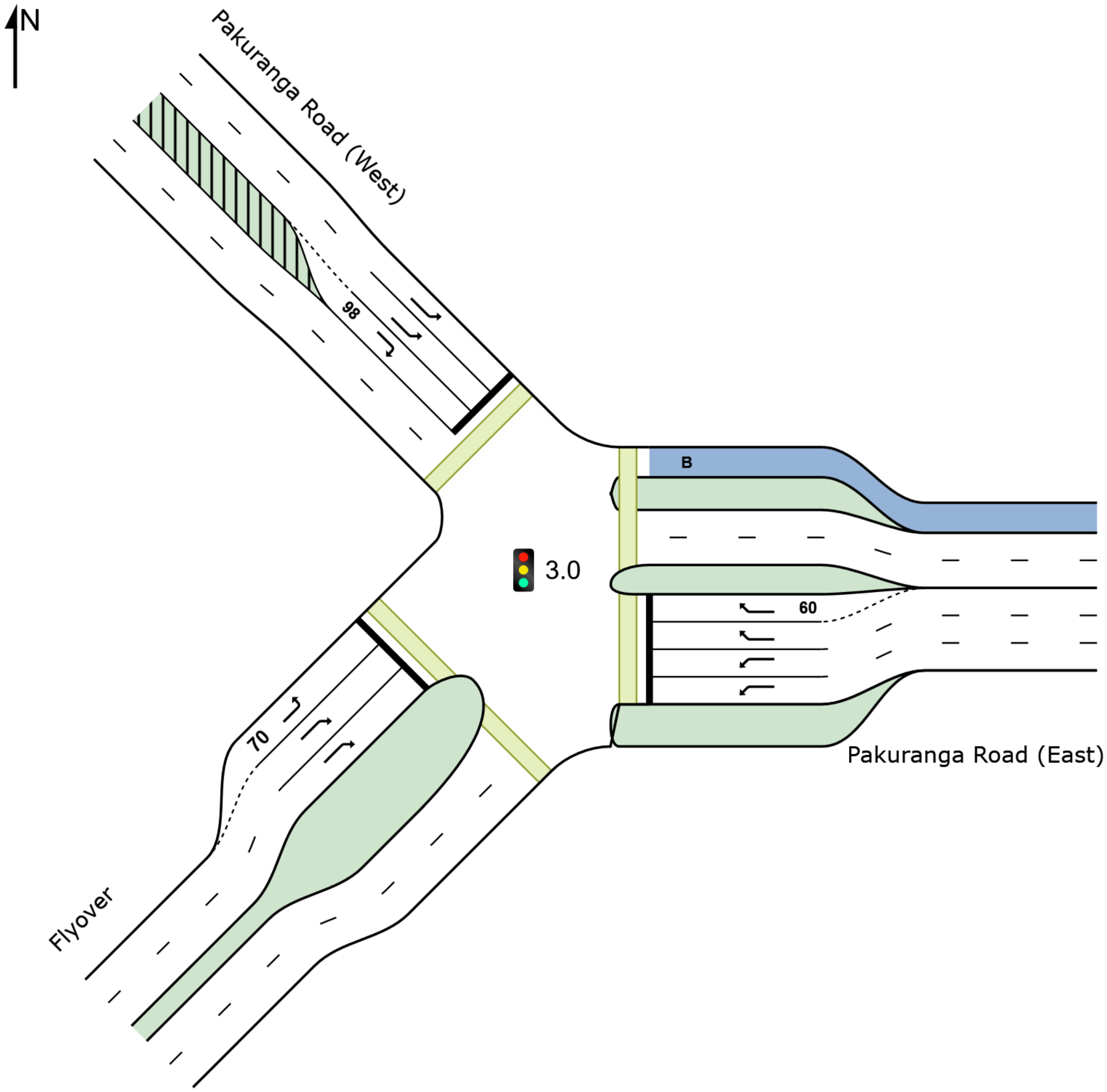


# SITE LAYOUT

## Site: 3.0 [3.0 Pakuranga Highway / Pakuranga Rd (Site Folder: AM)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated

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



# PHASING SUMMARY

## Site: 3.0 [3.0 Pakuranga Highway / Pakuranga Rd (Site Folder: AM)]

## Network: N101 [AM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated    Cycle Time = 80 seconds (Site Practical Cycle Time)

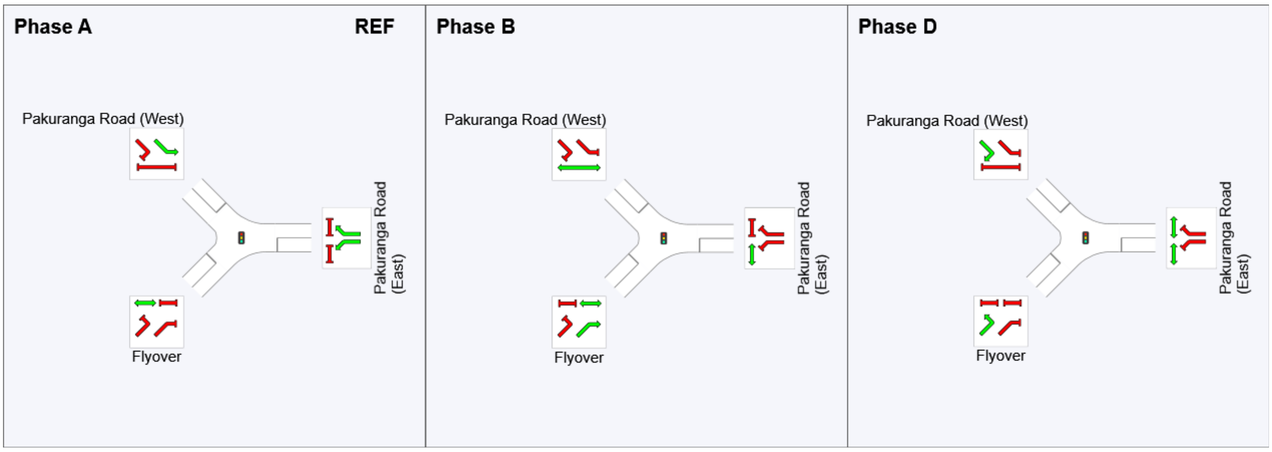
**Timings based on settings in the Site Phasing & Timing dialog**
**Phase Times determined by the program**
**Downstream lane blockage effects included in determining phase times**
**Phase Sequence: Variable Phasing**
**Reference Phase: Phase A**
**Input Phase Sequence: A, B, D**
**Output Phase Sequence: A, B, D**

### Phase Timing Summary

| Phase | A | B | D |
|---|---|---|---|
| Phase Change Time (sec) | 0 | 39 | 58 |
| Green Time (sec) | 33 | 13 | 16 |
| Phase Time (sec) | 39 | 19 | 22 |
| Phase Split | 49% | 24% | 28% |

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

### Output Phase Sequence




REF: Reference Phase
VAR: Variable Phase

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

# PHASING SUMMARY

## Site: 3.0 [3.0 Pakuranga Highway / Pakuranga Rd (Site Folder: PM)] Network: N101 [PM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated    Cycle Time = 120 seconds (Site User-Given Phase Times)

**Timings based on settings in the Site Phasing & Timing dialog**
**Phase Times specified by the user**
**Phase Sequence: Variable Phasing**
**Reference Phase: Phase A**
**Input Phase Sequence: A, D, B, C**
**Output Phase Sequence: A, D, B, C**

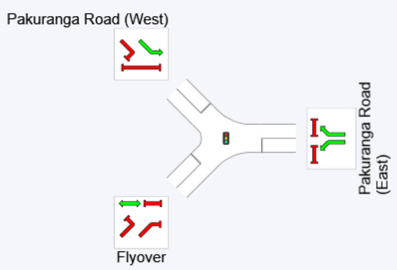
### Phase Timing Summary

| Phase | **A** | **D** | **B** | **C** |
|---|---|---|---|---|
| Phase Change Time (sec) | 0 | 47 | 84 | 106 |
| Green Time (sec) | 44 | 31 | 16 | 9 |
| Phase Time (sec) | 50 | 37 | 21 | 12 |
| Phase Split | 42% | 31% | 18% | 10% |

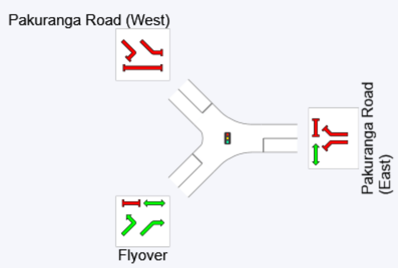
See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified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

### Output Phase Sequence

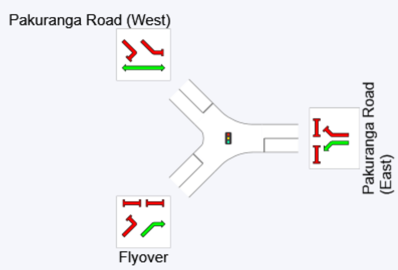
**Phase A** **REF**



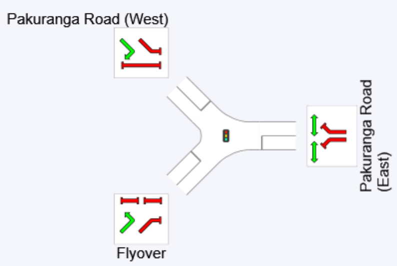

**Phase D**




**Phase B**




**Phase C**




REF: Reference Phase
VAR: Variable Phase

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

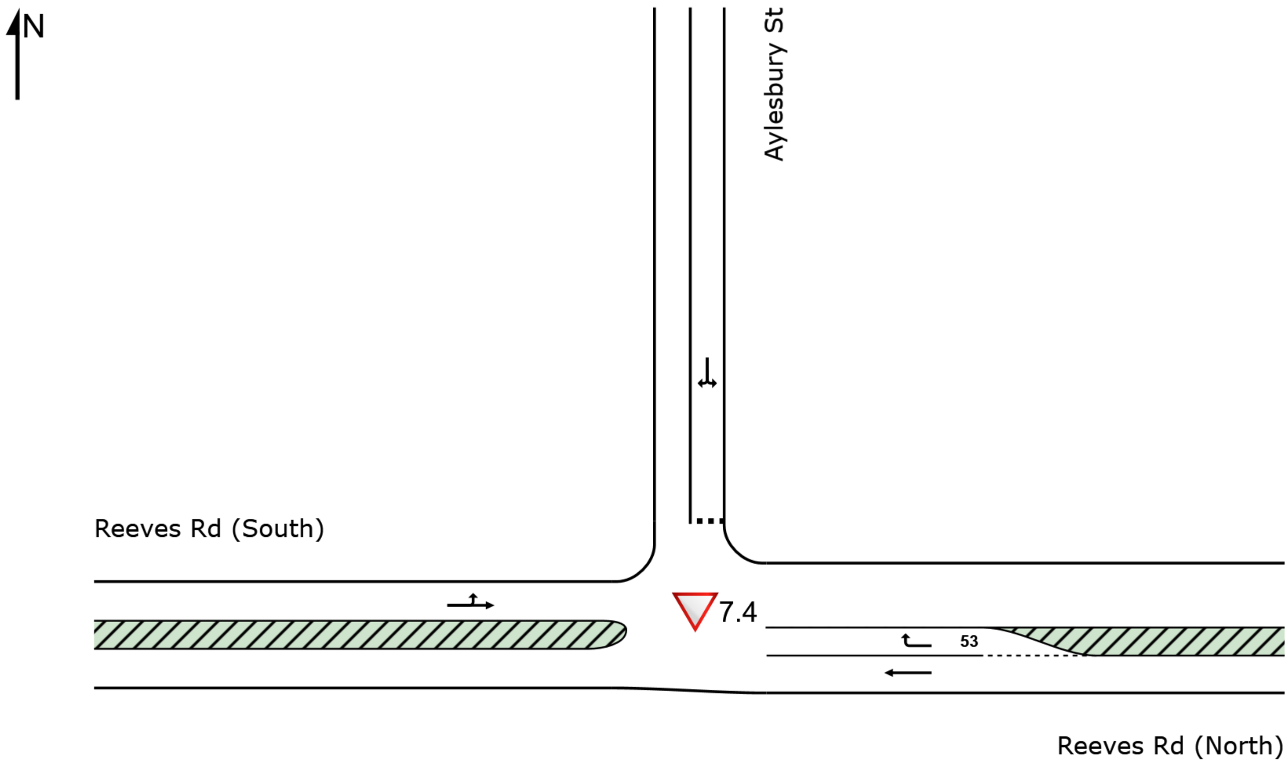

Organisation: AECOM AUSTRALIA PTY LTD | Licence: NETWORK / Enterprise | Processed: Sunday, 1 May 2022 2:38:25 pm
Project: C:\Users\jacques.vandenheever\Downloads\2028 Construction 2 PM - XL (1).sip9

# SITE LAYOUT

## ▽ Site: 7.4 [7.4 Reeves Rd/ Aylesbury St - XL (Site Folder: AM)]

New Site
Site Category: (None)
Give-Way (Two-Way)

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

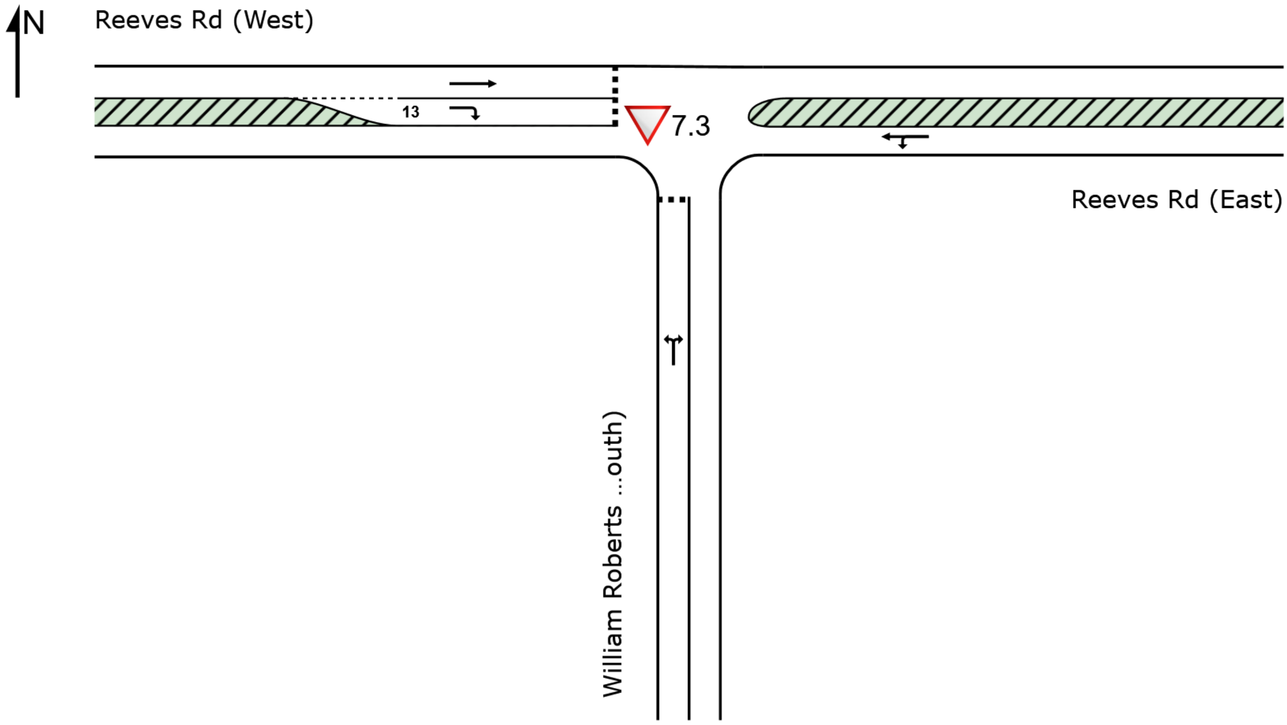


# SITE LAYOUT

## ▽ Site: 7.3 [7.3 William Roberts Rd / Reeves Rd - XL (Site Folder: AM)]

Site Category: (None)
Give-Way (Two-Way)

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

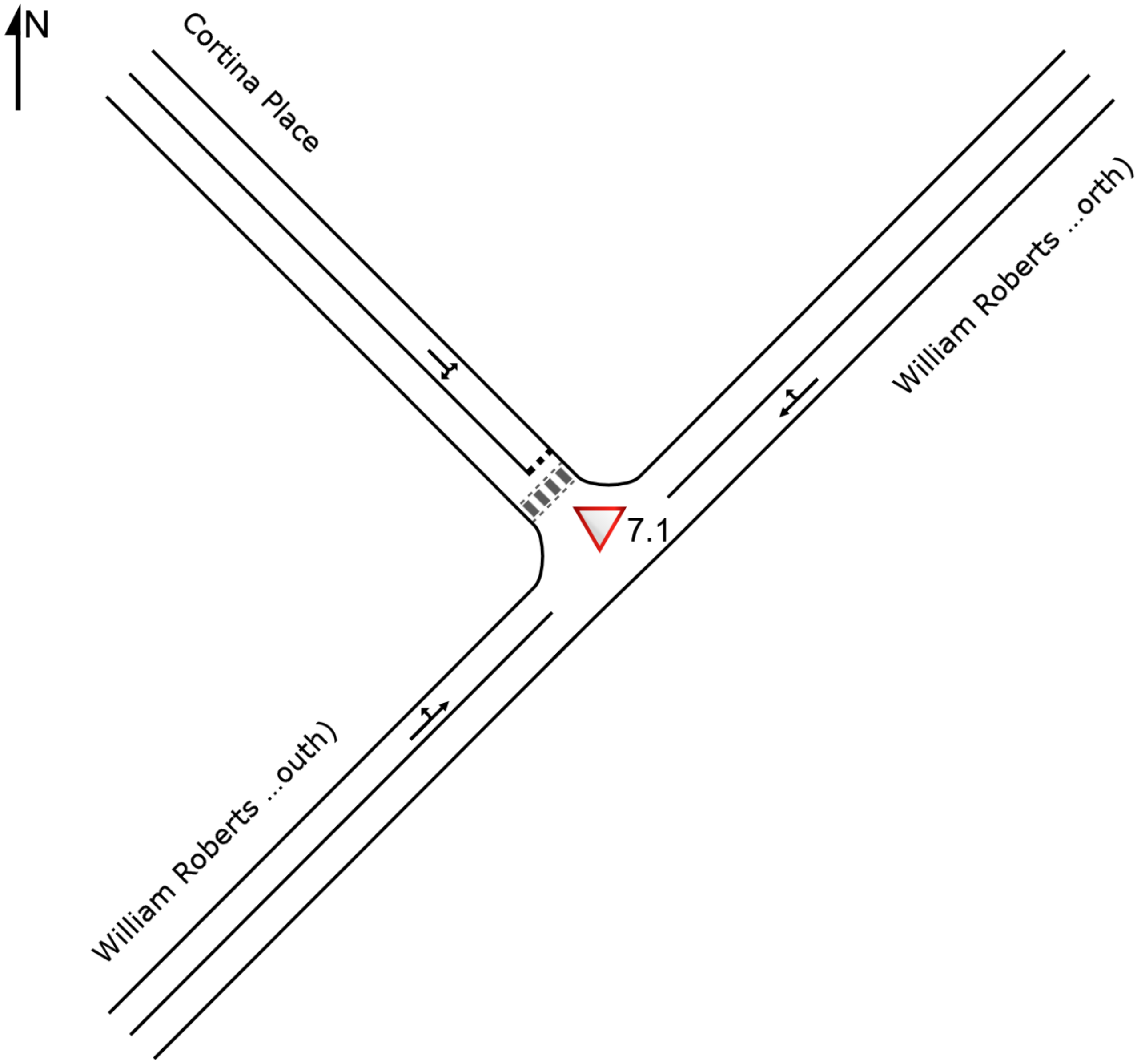


# SITE LAYOUT

## ▽ Site: 7.1 [7.1 William Roberts Rd / Cortina Pl (Site Folder: AM)]

Site Category: (None)
Give-Way (Two-Way)

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

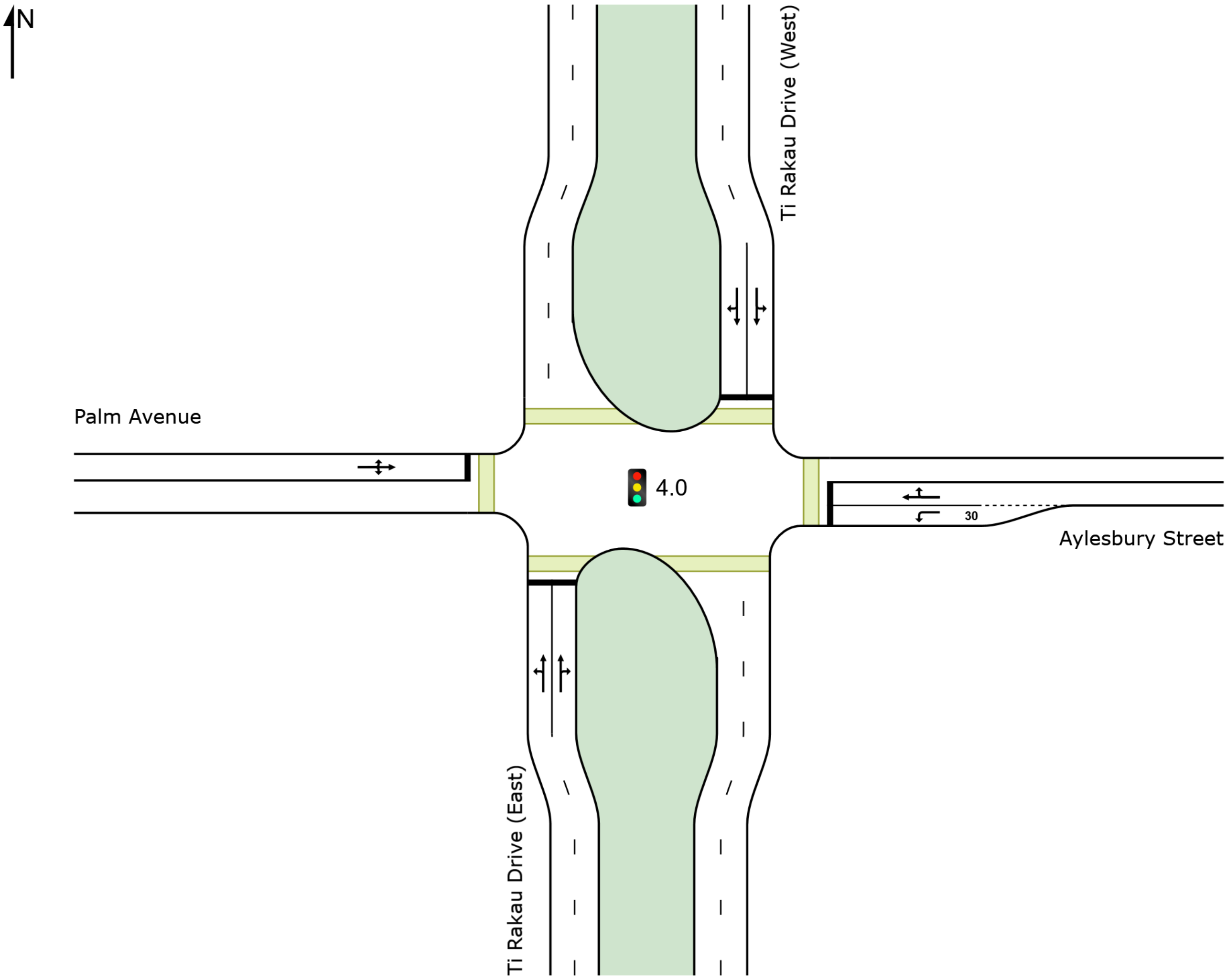


# SITE LAYOUT

## Site: 4.0 [4.0 Palm Ave / Aylesbury St (Site Folder: AM)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated

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



# PHASING SUMMARY

## Site: 4.0 [4.0 Palm Ave / Aylesbury St (Site Folder: AM)]

## Network: N101 [AM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated     Cycle Time = 70 seconds (Site Practical Cycle Time)

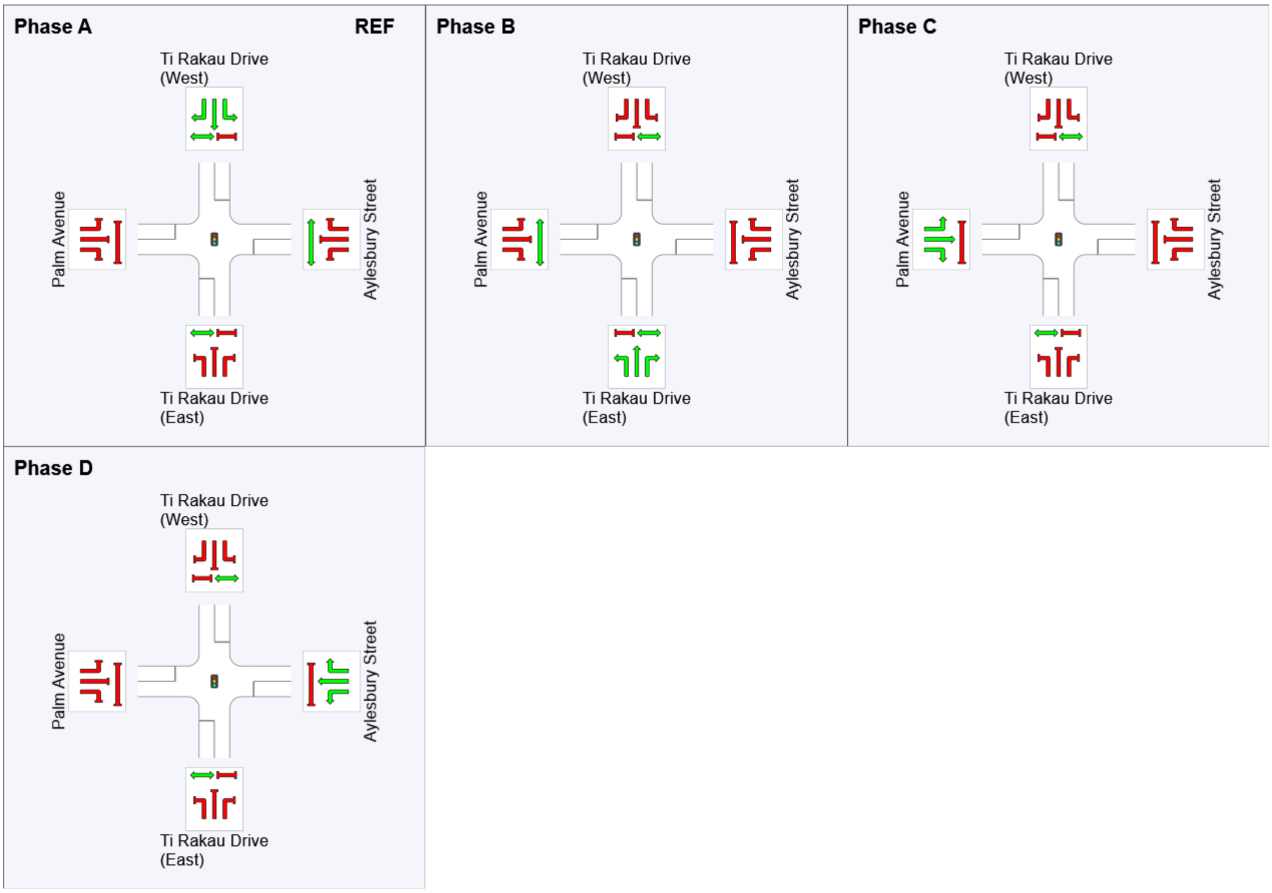
**Timings based on settings in the Site Phasing & Timing dialog**
**Phase Times determined by the program**
**Downstream lane blockage effects included in determining phase times**
**Green Split Priority has been specified**
**Phase Sequence: Variable Phasing**
**Reference Phase: Phase A**
**Input Phase Sequence: A, B, C, D**
**Output Phase Sequence: A, B, C, D**

### Phase Timing Summary

| Phase | A | B | C | D |
|---|---|---|---|---|
| Phase Change Time (sec) | 0 | 21 | 45 | 58 |
| Green Time (sec) | 15 | 18 | 7 | 6 |
| Phase Time (sec) | 21 | 24 | 13 | 12 |
| Phase Split | 30% | 34% | 19% | 17% |

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

### Output Phase Sequence




REF: Reference Phase
VAR: Variable Phase

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

# PHASING SUMMARY

## Site: 4.0 [4.0 Palm Ave / Aylesbury St (Site Folder: PM)]

## Network: N101 [PM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated    Cycle Time = 90 seconds (Site Practical Cycle Time)

**Timings based on settings in the Site Phasing & Timing dialog**
**Phase Times determined by the program**
**Downstream lane blockage effects included in determining phase times**
**Green Split Priority has been specified**
**Phase Sequence: Variable Phasing**
**Reference Phase: Phase A**
**Input Phase Sequence: A, B, C, D**
**Output Phase Sequence: A, B, C, D**

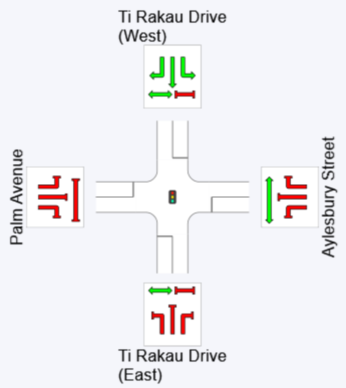
### Phase Timing Summary

| Phase | A | B | C | D |
|---|---|---|---|---|
| Phase Change Time (sec) | 0 | 31 | 63 | 75 |
| Green Time (sec) | 25 | 26 | 6 | 9 |
| Phase Time (sec) | 31 | 32 | 12 | 15 |
| Phase Split | 34% | 36% | 13% | 17% |

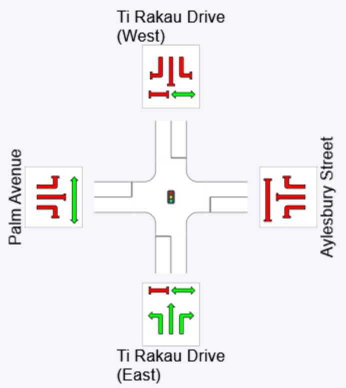
See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified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

### Output Phase Sequence

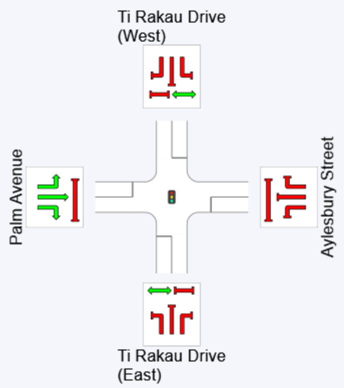
**Phase A** **REF**



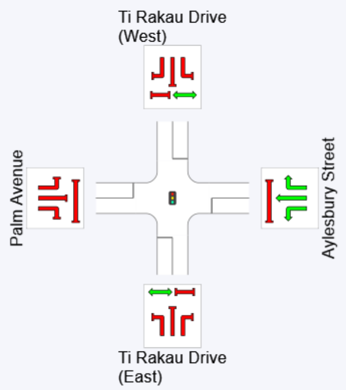

**Phase B**




**Phase C**




**Phase D**




REF: Reference Phase
VAR: Variable Phase

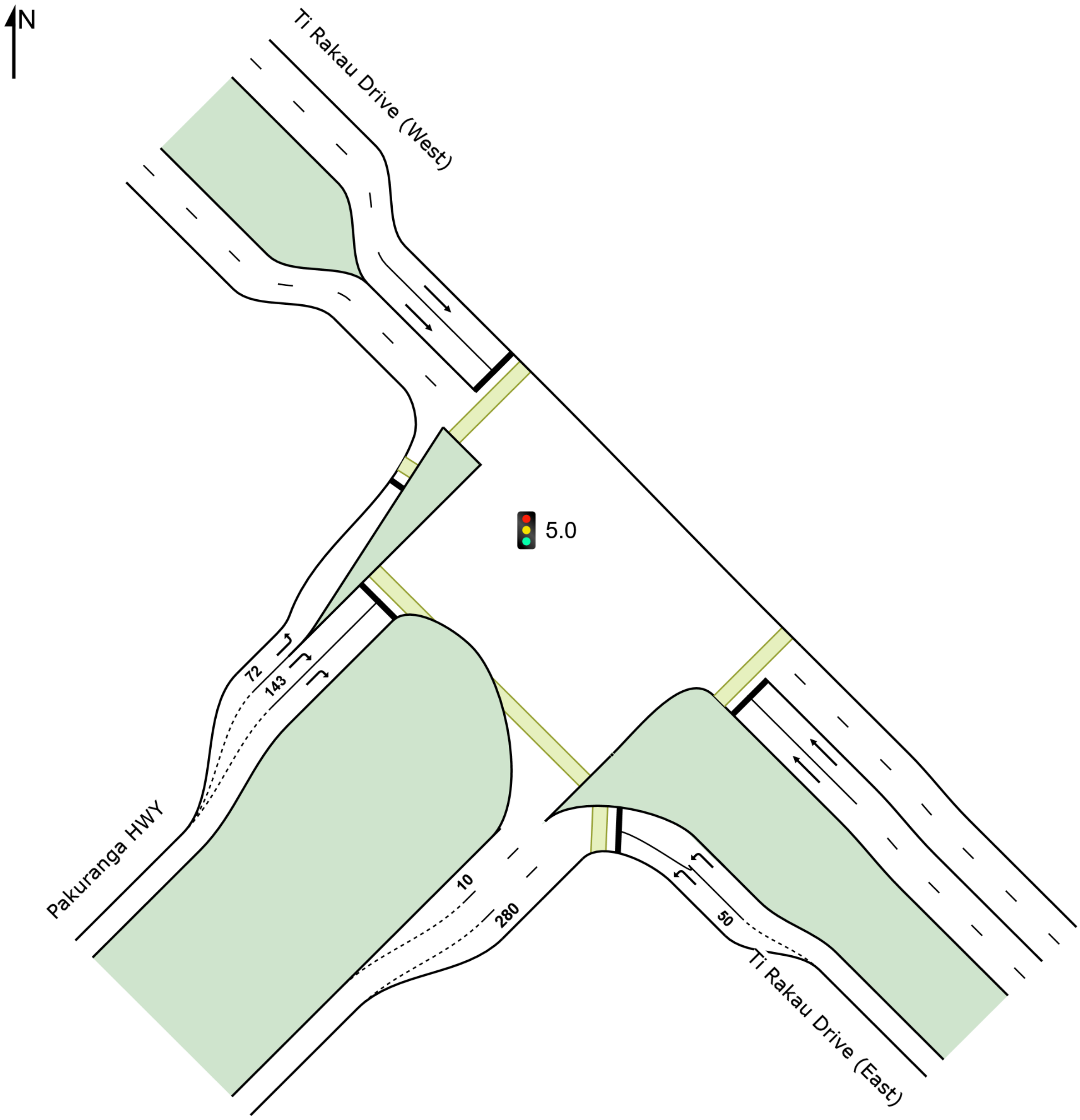
| | |
|---|---|
| Normal Movement | Permitted/Opposed |
| Slip/Bypass-Lane Movement | Opposed Slip/Bypass-Lane |
| Stopped Movement | Turn On Red |
| Other Movement Class (MC) Running | Undetected Movement |
| Mixed Running & Stopped MCs | Continuous Movement |
| Other Movement Class (MC) Stopped | Phase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

# SITE LAYOUT

## Site: 5.0 [5.0 Pakuranga Highway/ Reeves Rd (Site Folder: AM)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated

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



# PHASING SUMMARY

## Site: 5.0 [5.0 Pakuranga Highway/ Reeves Rd (Site Folder: AM)]

## Network: N101 [AM (Network Folder: General)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated     Cycle Time = 40 seconds (Site Practical Cycle Time)

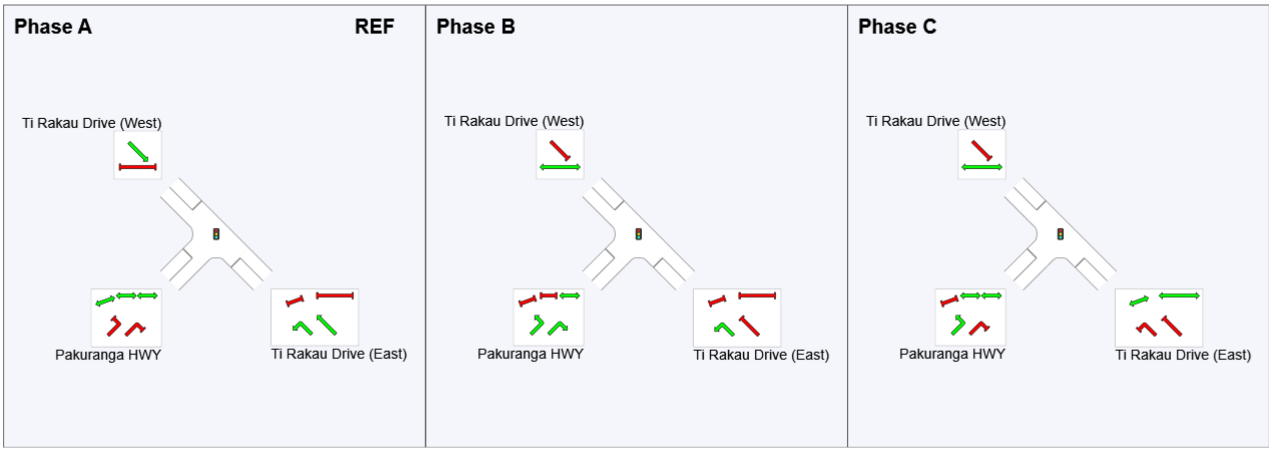
**Timings based on settings in the Site Phasing & Timing dialog**
**Phase Times determined by the program**
**Downstream lane blockage effects included in determining phase times**
**Phase Sequence: Map Extract Default**
**Reference Phase: Phase A**
**Input Phase Sequence: A, B, C**
**Output Phase Sequence: A, B, C**

### Phase Timing Summary

| Phase | A | B | C |
|---|---|---|---|
| Phase Change Time (sec) | 0 | 14 | 26 |
| Green Time (sec) | 8 | 6 | 11 |
| Phase Time (sec) | 14 | 9 | 17 |
| Phase Split | 35% | 23% | 43% |

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

### Output Phase Sequence




REF: Reference Phase
VAR: Variable Phase

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

# PHASING SUMMARY

## Site: 5.0 [5.0 Pakuranga Highway/ Reeves Rd (Site Folder: PM)]

## Network: N101 [PM (Network Folder: General)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated    Cycle Time = 80 seconds (Site Practical Cycle Time)

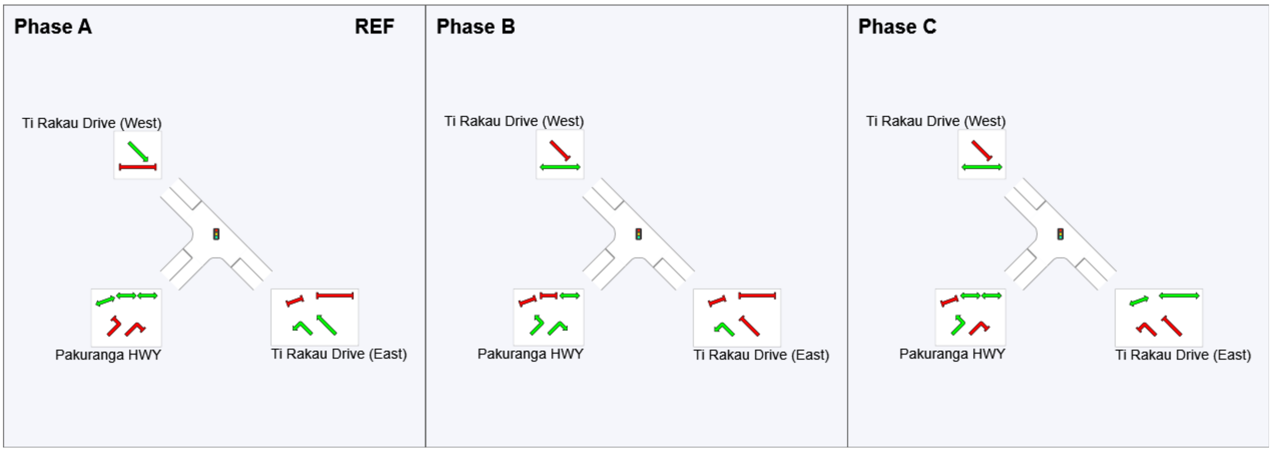
**Timings based on settings in the Site Phasing & Timing dialog**
**Phase Times determined by the program**
**Downstream lane blockage effects included in determining phase times**
**Phase Sequence: Map Extract Default**
**Reference Phase: Phase A**
**Input Phase Sequence: A, B, C**
**Output Phase Sequence: A, B, C**

### Phase Timing Summary

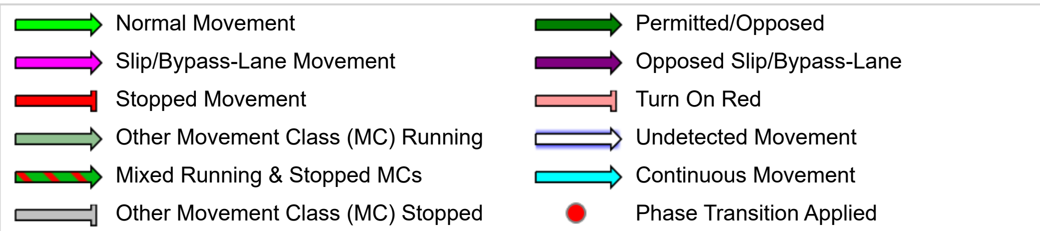
| Phase | A | B | C |
|---|---|---|---|
| Phase Change Time (sec) | 0 | 30 | 56 |
| Green Time (sec) | 24 | 20 | 20 |
| Phase Time (sec) | 30 | 24 | 26 |
| Phase Split | 38% | 30% | 33% |

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

### Output Phase Sequence




REF: Reference Phase
VAR: Variable Phase

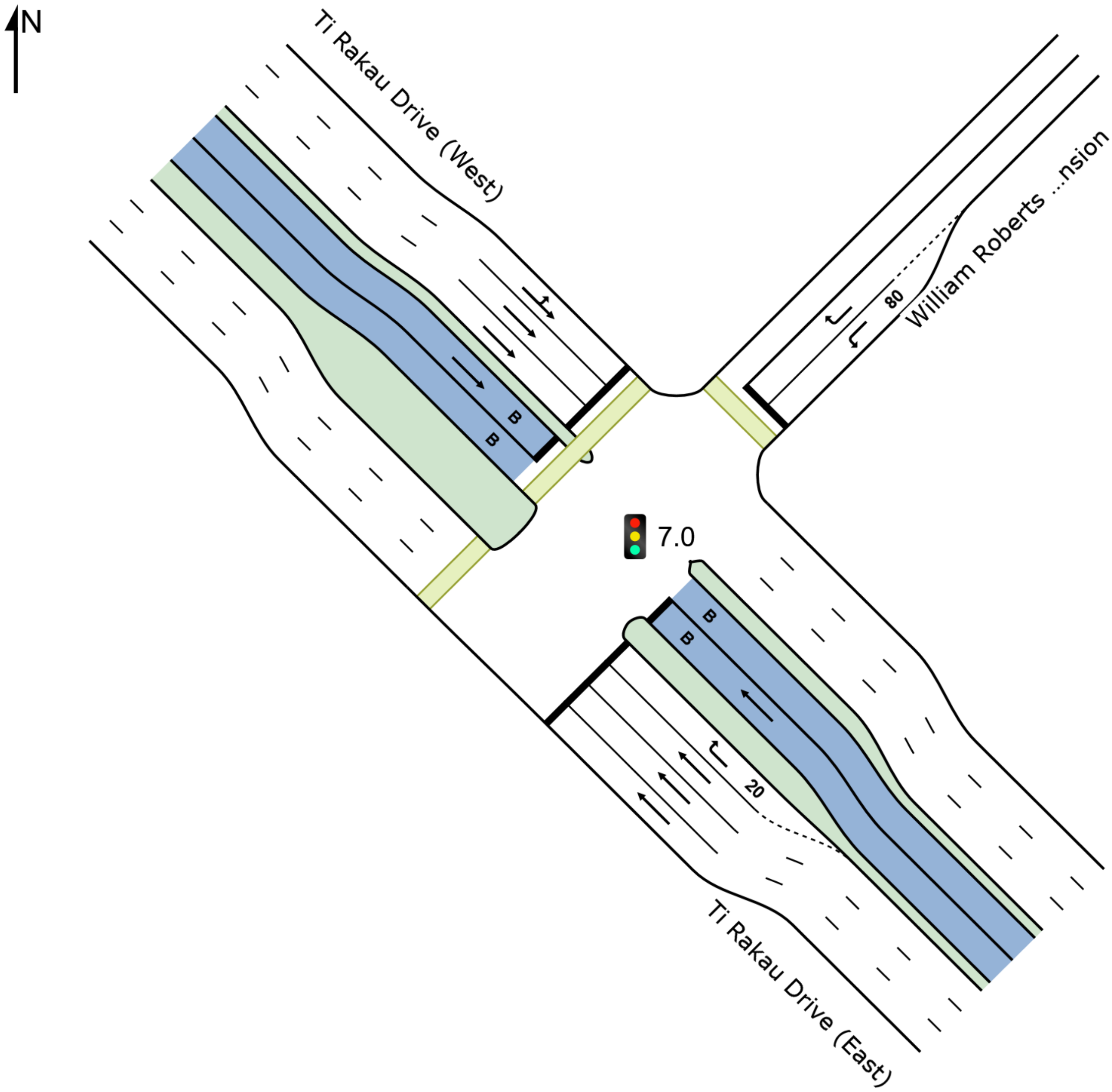


# SITE LAYOUT

## Site: 7.0 [7.0  William Roberts Rd / Ti Rakau Dr (Site Folder: AM)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated

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

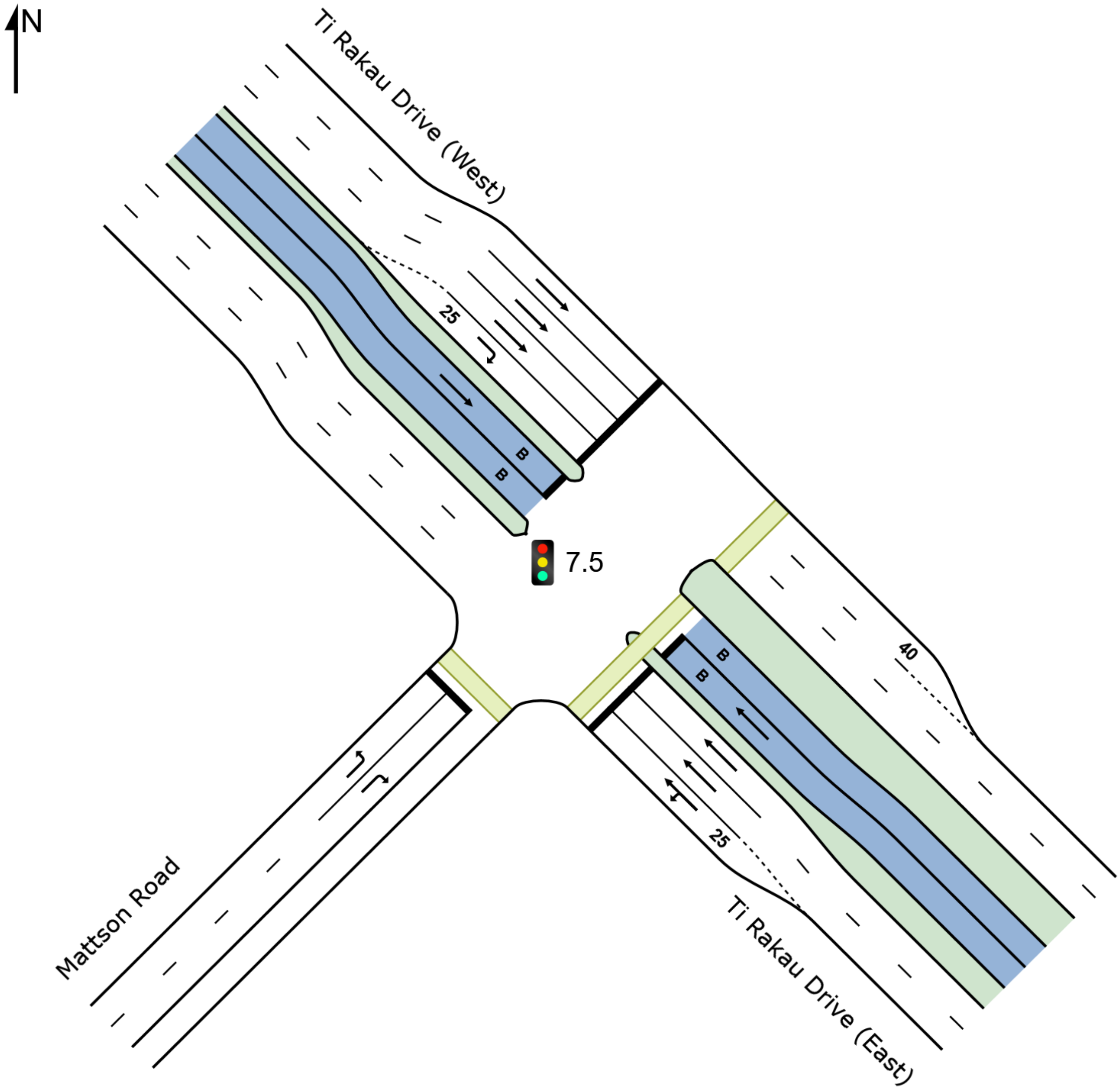


# SITE LAYOUT

## Site: 7.5 [7.5 Mattson Rd/ Ti Rakau Dr (Site Folder: AM)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated

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



# CCG PHASING SUMMARY

## Common Control Group: CCG2 [WRR / Mattson]

## Network: N101 [AM (Network Folder: General)]

EQUISAT (Fixed-Time/SCATS) Isolated     Cycle Time = 100 seconds (CCG Practical Cycle Time)

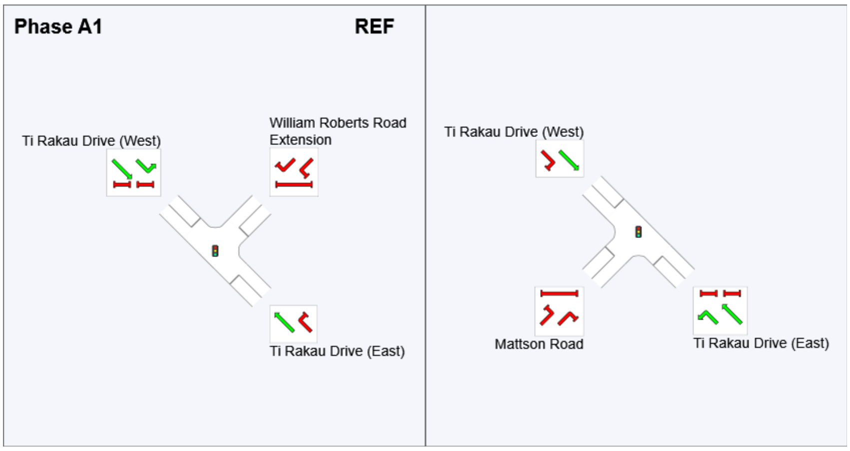
**Timings based on settings in the Network Timing dialog**
**Phase Times determined by the program**
**Downstream lane blockage effects included in determining phase times**
**Phase Sequence: CCG Phasing (phase reduction applied)**
**Reference Phase: Phase A1**
**Input Phase Sequence: A1, A2, B, C, D**
**Output Phase Sequence: A1, B, C, D**

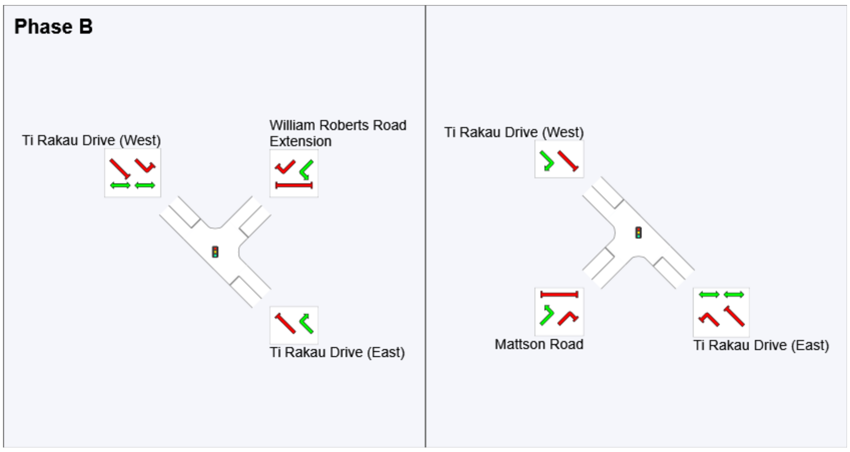
## Phase Timing Summary (CCG)

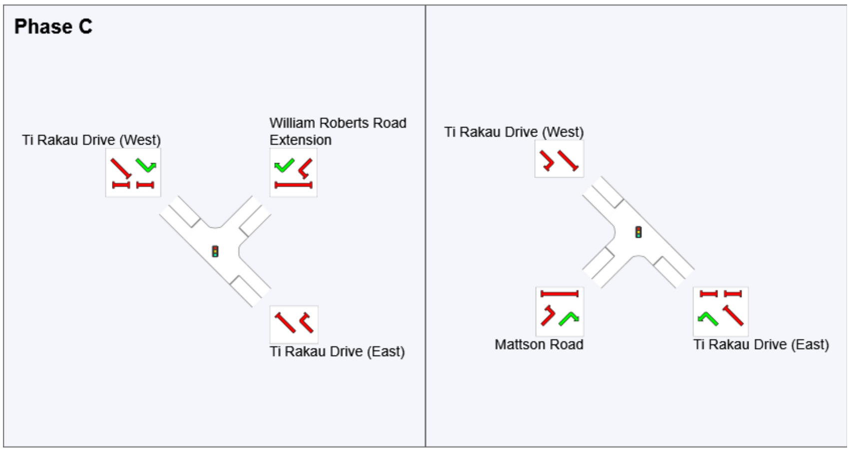
| Phase | A1 | B | C | D |
|---|---|---|---|---|
| Phase Change Time (sec) | 0 | 24 | 43 | 63 |
| Green Time (sec) | 18 | 13 | 14 | 31 |
| Phase Time (sec) | 24 | 19 | 20 | 37 |
| Phase Split | 24% | 19% | 20% | 37% |

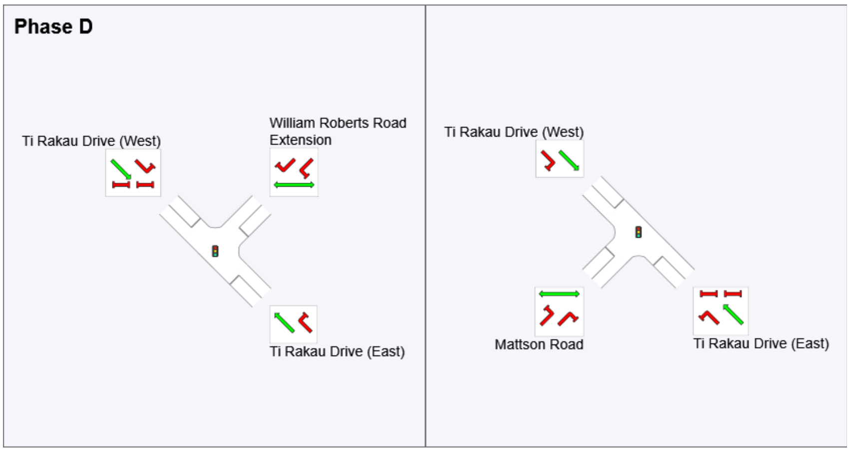
See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified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

## Output Phase Sequence (CCG)






REF: Reference Phase
VAR: Variable Phase

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

# CCG PHASING SUMMARY

## Common Control Group: CCG2 [WRR / Mattson]

## Network: N101 [PM (Network Folder: General)]

EQUISAT (Fixed-Time/SCATS) Isolated     Cycle Time = 60 seconds (CCG User-Given Phase Times)

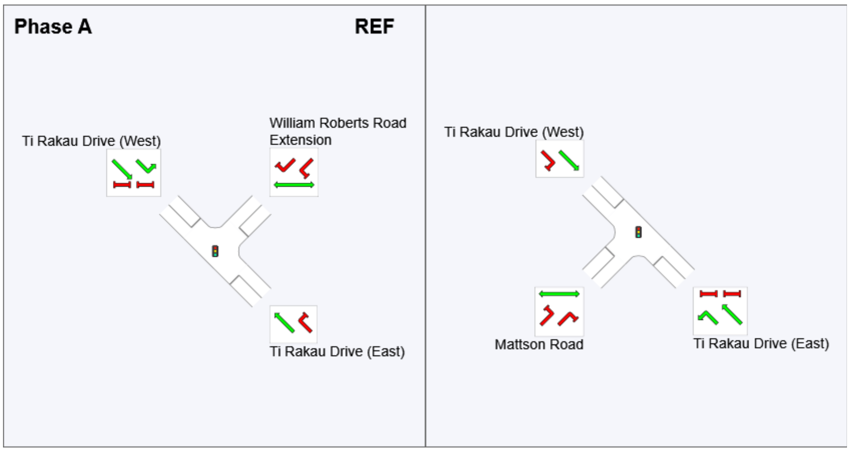
**Timings based on settings in the Network Timing dialog**
**Phase Times specified by the user**
**Phase Sequence: CCG Phasing**
**Reference Phase: Phase A**
**Input Phase Sequence: A, B, C**
**Output Phase Sequence: A, B, C**

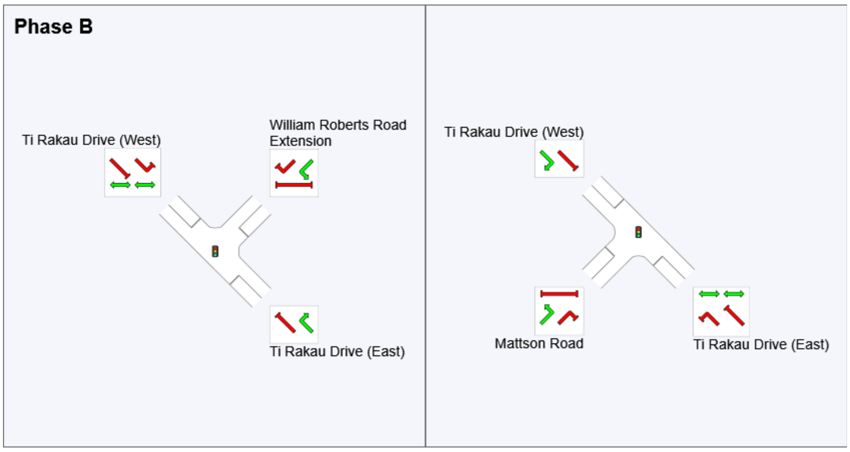
## Phase Timing Summary (CCG)

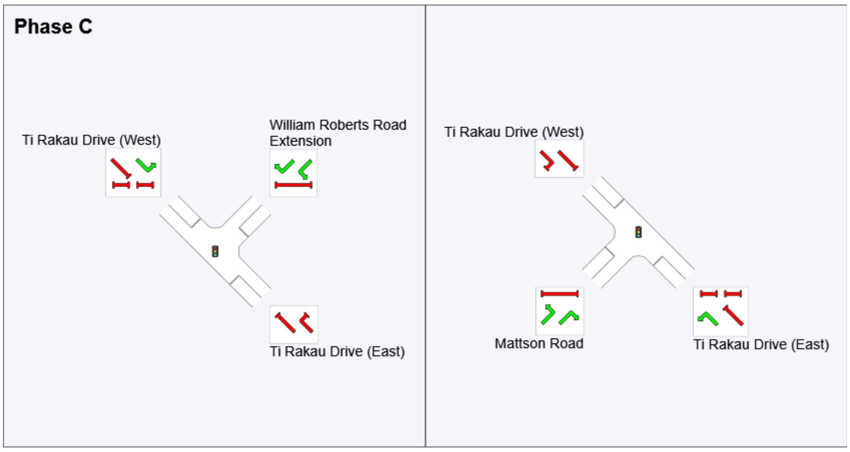
| Phase | A | B | C |
|---|---|---|---|
| Phase Change Time (sec) | 0 | 34 | 51 |
| Green Time (sec) | 28 | 11 | 6 |
| Phase Time (sec) | 34 | 14 | 12 |
| Phase Split | 57% | 23% | 20% |

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

## Output Phase Sequence (CCG)






REF: Reference Phase
VAR: Variable Phase

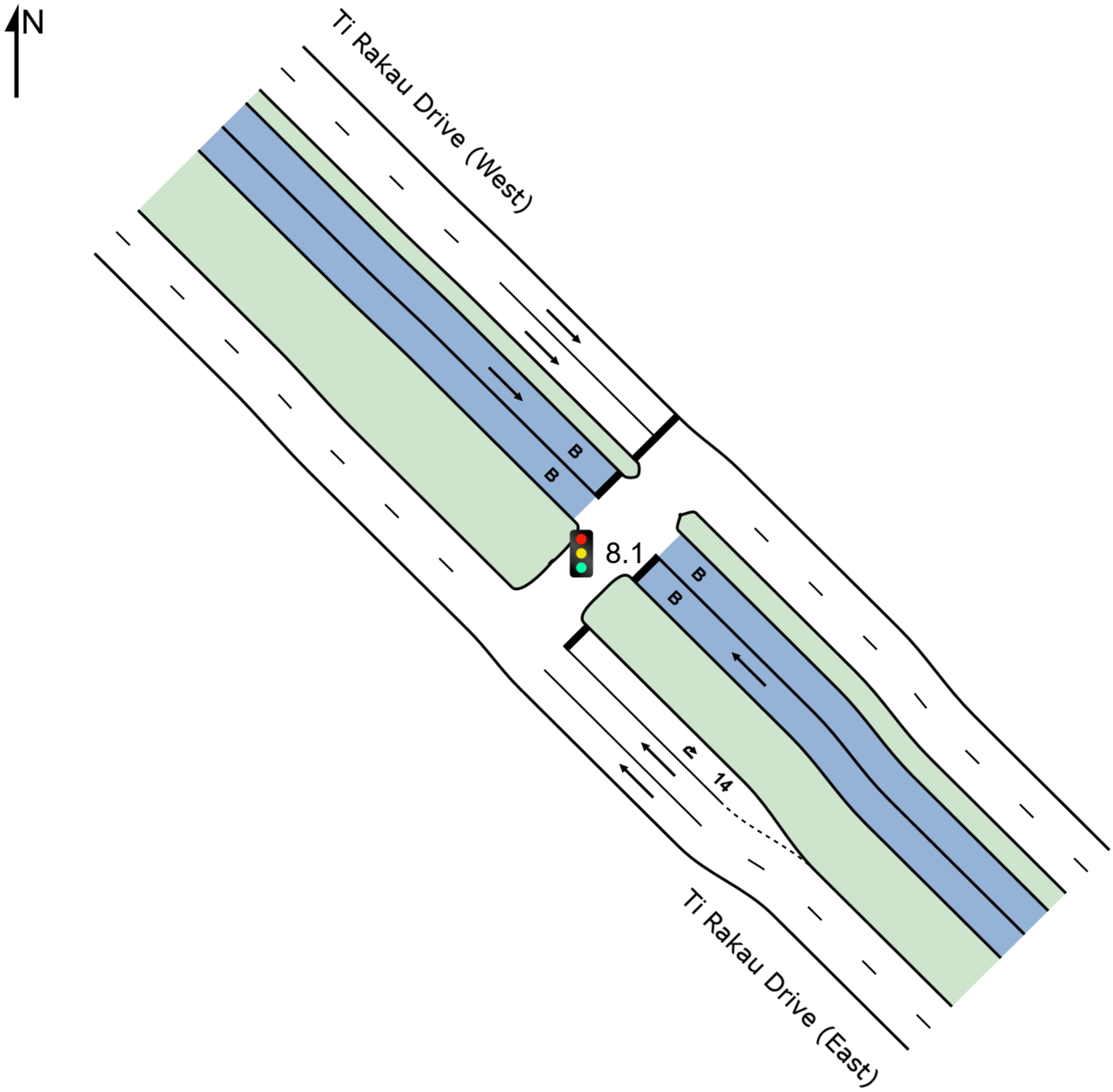
| | |
|---|---|
| Normal Movement | Permitted/Opposed |
| Slip/Bypass-Lane Movement | Opposed Slip/Bypass-Lane |
| Stopped Movement | Turn On Red |
| Other Movement Class (MC) Running | Undetected Movement |
| Mixed Running & Stopped MCs | Continuous Movement |
| Other Movement Class (MC) Stopped | Phase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

# SITE LAYOUT

## Site: 8.1 [8.1 U-turn - West of Marriot Rd (Site Folder: AM)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated

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



# PHASING SUMMARY

## Site: 8.1 [8.1 U-turn - West of Marriot Rd (Site Folder: AM)]

Network: N101 [AM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated    Cycle Time = 30 seconds (Site Practical Cycle Time)

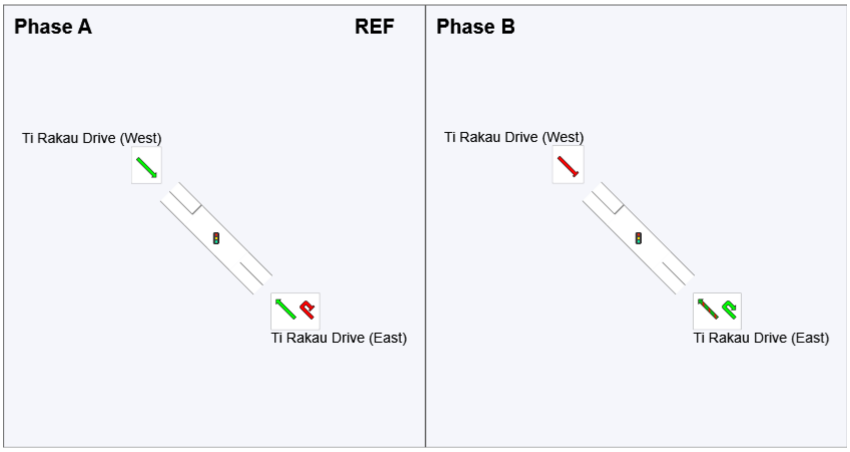
**Timings based on settings in the Site Phasing & Timing dialog**
**Phase Times determined by the program**
**Downstream lane blockage effects included in determining phase times**
**Phase Sequence: Opposed Turns**
**Reference Phase: Phase A**
**Input Phase Sequence: A, B**
**Output Phase Sequence: A, B**

## Phase Timing Summary

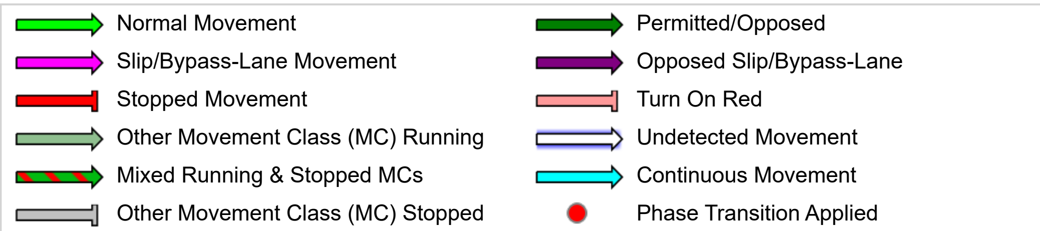
| Phase | A | B |
|---|---|---|
| Phase Change Time (sec) | 0 | 18 |
| Green Time (sec) | 12 | 6 |
| Phase Time (sec) | 18 | 12 |
| Phase Split | 60% | 40% |

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

## Output Phase Sequence




REF: Reference Phase
VAR: Variable Phase



# PHASING SUMMARY

## Site: 8.1 [8.1 U-turn - West of Marriot Rd (Site Folder: PM)]

## Network: N101 [PM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated    Cycle Time = 40 seconds (Site Practical Cycle Time)

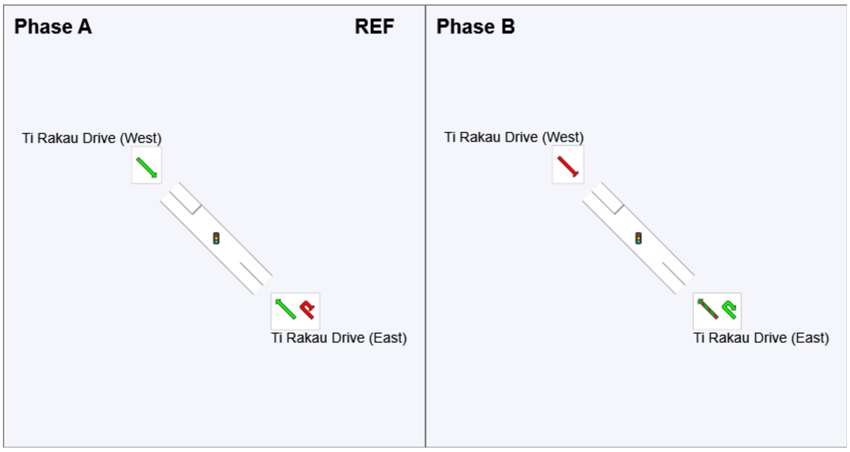
**Timings based on settings in the Site Phasing & Timing dialog**
**Phase Times determined by the program**
**Downstream lane blockage effects included in determining phase times**
**Phase Sequence: Opposed Turns**
**Reference Phase: Phase A**
**Input Phase Sequence: A, B**
**Output Phase Sequence: A, B**

## Phase Timing Summary

| Phase | A | B |
|---|---|---|
| Phase Change Time (sec) | 0 | 27 |
| Green Time (sec) | 21 | 7 |
| Phase Time (sec) | 27 | 13 |
| Phase Split | 68% | 33% |

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

## Output Phase Sequence




REF: Reference Phase
VAR: Variable Phase

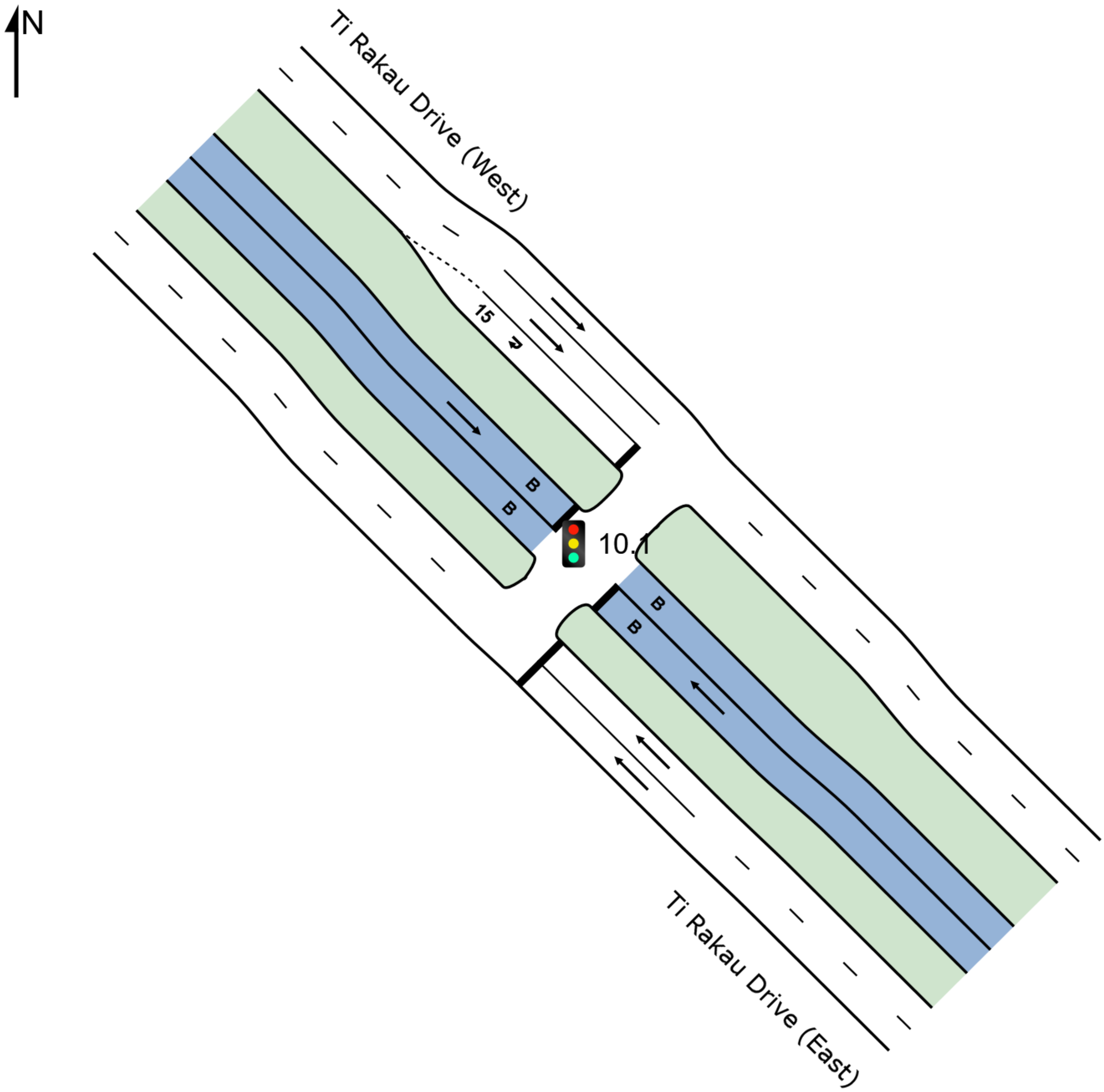
| | |
|---|---|
| Normal Movement | Permitted/Opposed |
| Slip/Bypass-Lane Movement | Opposed Slip/Bypass-Lane |
| Stopped Movement | Turn On Red |
| Other Movement Class (MC) Running | Undetected Movement |
| Mixed Running & Stopped MCs | Continuous Movement |
| Other Movement Class (MC) Stopped | Phase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

# SITE LAYOUT

## Site: 10.1 [10.1 U-turn - East of Edgewater Dr (West) (Site Folder: AM)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated

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



# PHASING SUMMARY

## Site: 10.1 [10.1 U-turn - East of Edgewater Dr (West) (Site Folder: AM)]

## Network: N101 [AM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated    Cycle Time = 40 seconds (Site Practical Cycle Time)

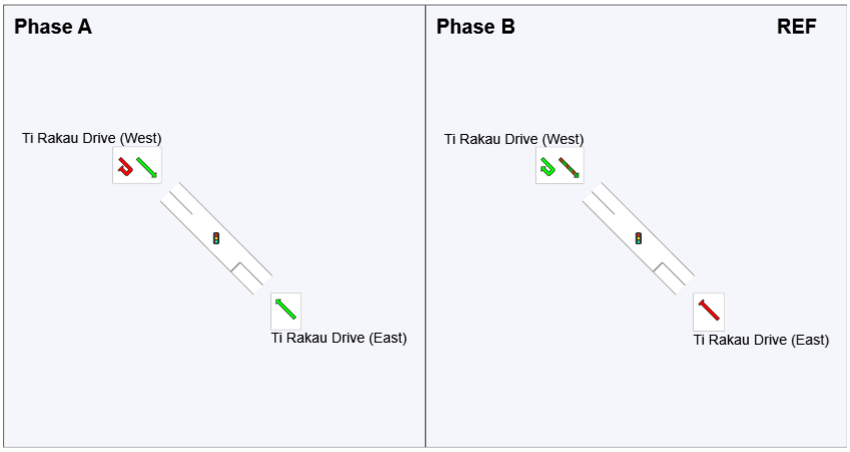
**Timings based on settings in the Site Phasing & Timing dialog**
**Phase Times determined by the program**
**Downstream lane blockage effects included in determining phase times**
**Phase Sequence: Opposed Turns**
**Reference Phase: Phase B**
**Input Phase Sequence: A, B**
**Output Phase Sequence: A, B**

### Phase Timing Summary

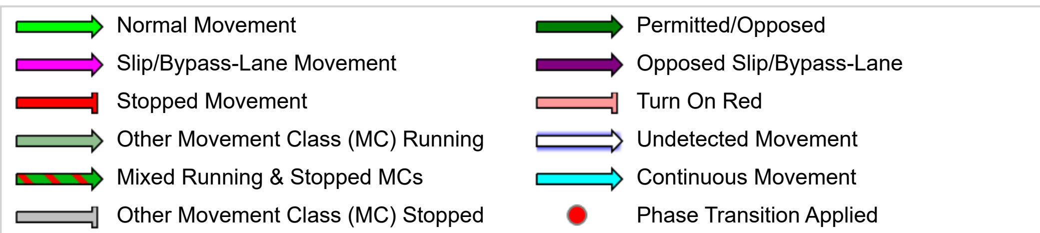
| Phase | A | B |
|---|---|---|
| Phase Change Time (sec) | 13 | 0 |
| Green Time (sec) | 21 | 7 |
| Phase Time (sec) | 27 | 13 |
| Phase Split | 68% | 33% |

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

### Output Phase Sequence




REF: Reference Phase
VAR: Variable Phase



# PHASING SUMMARY

## Site: 10.1 [10.1 U-turn - East of Edgewater Dr (West) (Site Folder: PM)]

## Network: N101 [PM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated    Cycle Time = 50 seconds (Site Practical Cycle Time)

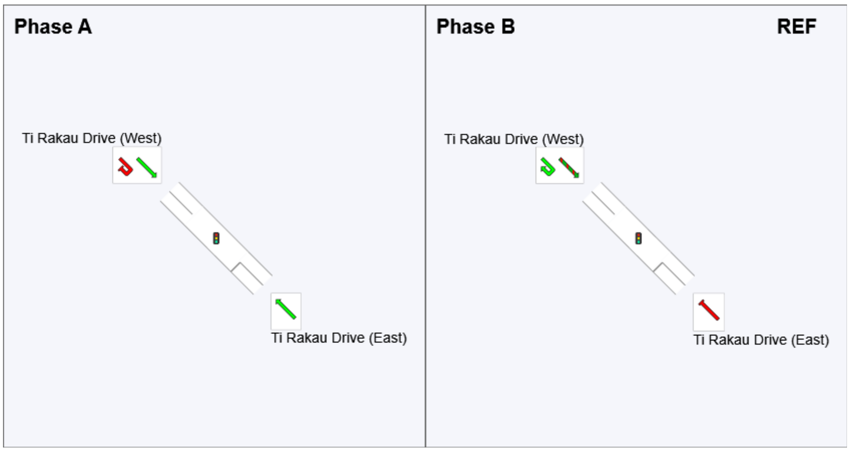
**Timings based on settings in the Site Phasing & Timing dialog**
**Phase Times determined by the program**
**Downstream lane blockage effects included in determining phase times**
**Phase Sequence: Opposed Turns**
**Reference Phase: Phase B**
**Input Phase Sequence: A, B**
**Output Phase Sequence: A, B**

### Phase Timing Summary

| Phase | A | B |
|---|---|---|
| Phase Change Time (sec) | 13 | 0 |
| Green Time (sec) | 31 | 7 |
| Phase Time (sec) | 37 | 13 |
| Phase Split | 74% | 26% |

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

### Output Phase Sequence




REF: Reference Phase
VAR: Variable Phase

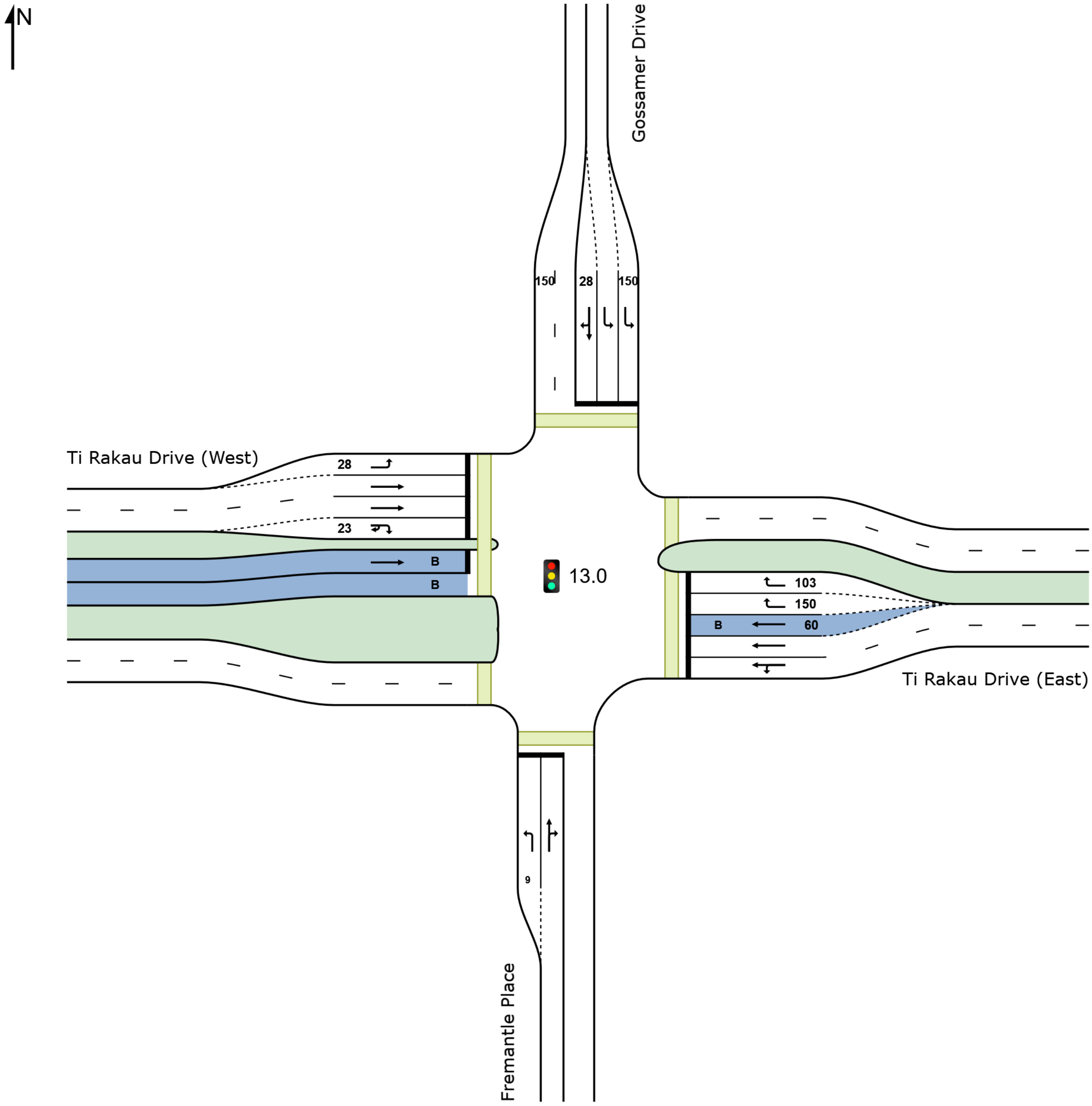
| | |
|---|---|
| Normal Movement | Permitted/Opposed |
| Slip/Bypass-Lane Movement | Opposed Slip/Bypass-Lane |
| Stopped Movement | Turn On Red |
| Other Movement Class (MC) Running | Undetected Movement |
| Mixed Running & Stopped MCs | Continuous Movement |
| Other Movement Class (MC) Stopped | Phase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

# SITE LAYOUT

## Site: 13.0 [13.0 Gossamer Dr / Ti Rakau Dr (Site Folder: AM)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated

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



# PHASING SUMMARY

## Site: 13.0 [13.0 Gossamer Dr / Ti Rakau Dr (Site Folder: AM)]

## Network: N101 [AM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated    Cycle Time = 140 seconds (Site User-Given Phase Times)

**Timings based on settings in the Site Phasing & Timing dialog**
**Phase Times specified by the user**
**Phase Sequence: Variable Phasing**
**Reference Phase: Phase A**
**Input Phase Sequence: A, Bus, C, D, E, F**
**Output Phase Sequence: A, Bus, C, D, E, F**

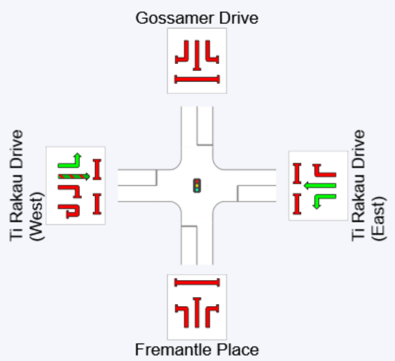
### Phase Timing Summary

| Phase | A | Bus | C | D | E | F |
|---|---|---|---|---|---|---|
| Phase Change Time (sec) | 0 | 50 | 67 | 81 | 98 | 120 |
| Green Time (sec) | 44 | 11 | 10 | 11 | 16 | 15 |
| Phase Time (sec) | 50 | 15 | 16 | 17 | 21 | 21 |
| Phase Split | 36% | 11% | 11% | 12% | 15% | 15% |

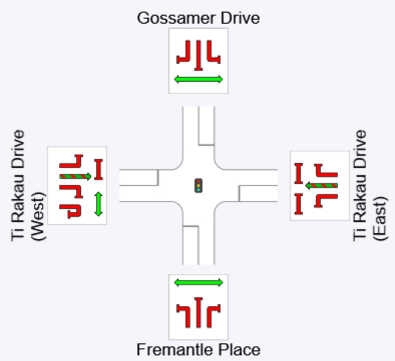
See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified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

### Output Phase Sequence

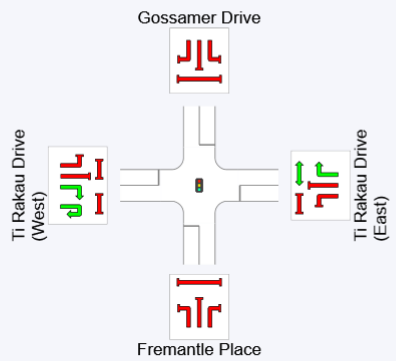
**Phase A** **REF**



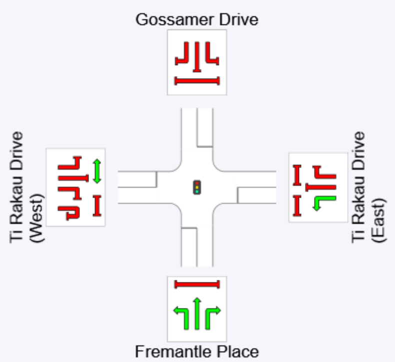

**Phase Bus**



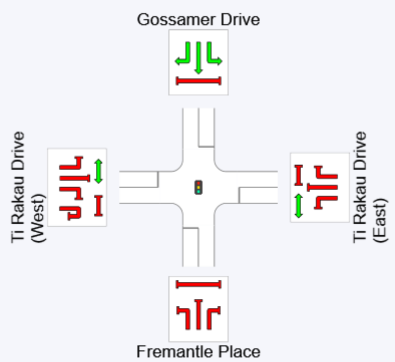

**Phase C**



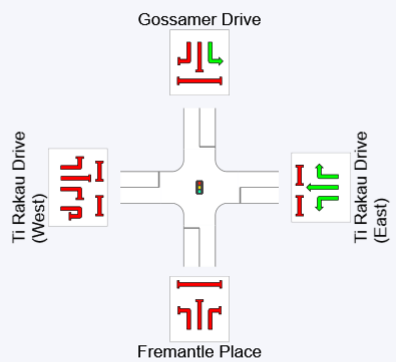

**Phase D**




**Phase E**




**Phase F**




REF: Reference Phase
VAR: Variable Phase

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

# PHASING SUMMARY

## Site: 13.0 [13.0 Gossamer Dr / Ti Rakau Dr (Site Folder: PM)]

## Network: N101 [PM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated    Cycle Time = 150 seconds (Site User-Given Phase Times)

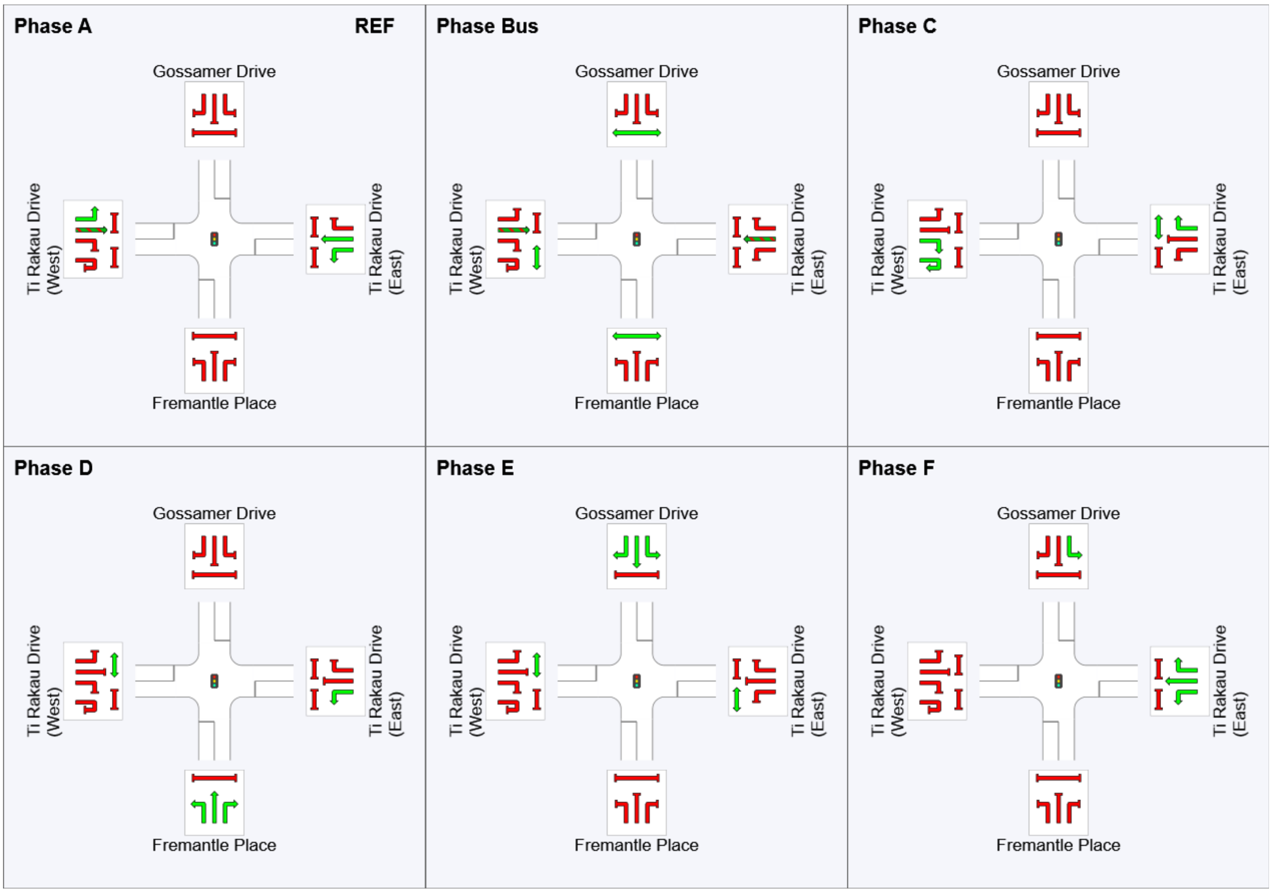
**Timings based on settings in the Site Phasing & Timing dialog**
**Phase Times specified by the user**
**Phase Sequence: Variable Phasing**
**Reference Phase: Phase A**
**Input Phase Sequence: A, Bus, C, D, E, F**
**Output Phase Sequence: A, Bus, C, D, E, F**

## Phase Timing Summary

| Phase | A | Bus | C | D | E | F |
|---|---|---|---|---|---|---|
| Phase Change Time (sec) | 0 | 56 | 74 | 88 | 107 | 126 |
| Green Time (sec) | 50 | 12 | 10 | 14 | 13 | 20 |
| Phase Time (sec) | 56 | 16 | 15 | 20 | 17 | 26 |
| Phase Split | 37% | 11% | 10% | 13% | 11% | 17% |

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

## Output Phase Sequence




REF: Reference Phase
VAR: Variable Phase

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

# Appendix G

**Construction Scenario 2 – Lane performance Summaries**

# LANE SUMMARY

## Site: 1.0 [1.0 Pakuranga Rd / Ti Rakau Dr (Site Folder: AM)]

## Network: N101 [AM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 140 seconds (Site Practical Cycle Time)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Ti Rakau Drive | | | | | | | | | | | | | | | |
| Lane 1 | 596 | 9.6 | 596 | 9.6 | 825[1] | 0.722 | 100 | 18.5 | LOS B | 22.4 | 169.5 | Full | 174 | 0.0 | 12.6 |
| Lane 2 (B) | 21 | 100.0 | 21 | 100.0 | 71 | 0.298 | 100 | 76.9 | LOS E | 1.3 | 16.8 | Short | 16 | 0.0 | NA |
| Lane 3 | 62 | 4.8 | 62 | 4.8 | 293 | 0.211 | 100 | 59.5 | LOS E | 3.3 | 24.1 | Full | 174 | 0.0 | 0.0 |
| Lane 4 | 62 | 4.8 | 62 | 4.8 | 293 | 0.211 | 100 | 59.5 | LOS E | 3.3 | 24.1 | Short | 40 | 0.0 | NA |
| Approach | 741 | 11.3 | 741 | 11.3 | | 0.722 | | 27.0 | LOS C | 22.4 | 169.5 | | | | |
| East: Pakuranga Road (East) | | | | | | | | | | | | | | | |
| Lane 1 | 140 | 7.9 | 139 | 7.8 | 535[1] | 0.259 | 100 | 27.0 | LOS C | 4.8 | 35.6 | Short | 21 | 0.0 | NA |
| Lane 2 | 606 | 5.3 | 601 | 5.2 | 730[1] | 0.824 | 100 | 33.7 | LOS C | 19.6[N4] | 143.2[N4] | Full | 98 | 0.0 | 50.0 |
| Lane 3 | 515 | 9.9 | 510 | 9.9 | 619 | 0.824 | 100 | 49.4 | LOS D | 18.9[N4] | 143.2[N4] | Full | 98 | 0.0 | 50.0 |
| Approach | 1261 | 7.5 | 1250[N1] | 7.4 | | 0.824 | | 39.4 | LOS D | 19.6 | 143.2 | | | | |
| West: Pakuranga Road (West) | | | | | | | | | | | | | | | |
| Lane 1 (B) | 26 | 100.0 | 26 | 100.0 | 48 | 0.538 | 100 | 80.0 | LOS E | 1.7 | 22.3 | Full | 380 | 0.0 | 0.0 |
| Lane 2 | 430 | 7.6 | 430 | 7.6 | 515 | 0.835 | 100 | 56.4 | LOS E | 26.4 | 197.1 | Full | 380 | 0.0 | 0.0 |
| Lane 3 | 430 | 7.6 | 430 | 7.6 | 515 | 0.835 | 100 | 56.4 | LOS E | 26.4 | 197.1 | Full | 380 | 0.0 | 0.0 |
| Lane 4 | 204 | 18.1 | 204 | 18.1 | 245 | 0.831 | 100 | 74.8 | LOS E | 13.3 | 107.7 | Short | 178 | 0.0 | NA |
| Lane 5 | 204 | 18.1 | 204 | 18.1 | 245 | 0.831 | 100 | 74.8 | LOS E | 13.3 | 107.7 | Short | 105 | 0.0 | NA |
| Approach | 1294 | 12.8 | 1294 | 12.8 | | 0.835 | | 62.7 | LOS E | 26.4 | 197.1 | | | | |
| Intersection | 3296 | 10.4 | 3285[N1] | 10.4 | | 0.835 | | 45.8 | LOS D | 26.4 | 197.1 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.
N4 Average back of queue has been restricted to the available queue storage space.

**Approach Lane Flows (veh/h)**

South: Ti Rakau Drive

| Mov. From S To Exit: | L2 W | R2 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 596 | - | 596 | 9.6 | 825[1] | 0.722 | 100 | NA | NA |
| Lane 2 | 21 | - | 21 | 100.0 | 71 | 0.298 | 100 | 19.6 | 1 |
| Lane 3 | - | 62 | 62 | 4.8 | 293 | 0.211 | 100 | NA | NA |
| Lane 4 | - | 62 | 62 | 4.8 | 293 | 0.211 | 100 | 0.0 | 3 |
| Approach | 617 | 124 | 741 | 11.3 | | 0.722 | | | |

East: Pakuranga Road (East)

| Mov. From E To Exit: | L2 S | T1 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 139 | - | 139 | 7.8 | 535[1] | 0.259 | 100 | 64.2 | 2 |
| Lane 2 | - | 601 | 601 | 5.2 | 730[1] | 0.824 | 100 | NA | NA |
| Lane 3 | - | 510 | 510 | 9.9 | 619 | 0.824 | 100 | NA | NA |
| Approach | 139 | 1111 | 1250 | 7.4 | | 0.824 | | | |

West: Pakuranga Road (West)

| Mov. From W To Exit: | T1 E | R2 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 9 | 17 | 26 | 100.0 | 48 | 0.538 | 100 | NA | NA |
| Lane 2 | 430 | - | 430 | 7.6 | 515 | 0.835 | 100 | NA | NA |
| Lane 3 | 430 | - | 430 | 7.6 | 515 | 0.835 | 100 | NA | NA |
| Lane 4 | - | 204 | 204 | 18.1 | 245 | 0.831 | 100 | 0.0 | 3 |
| Lane 5 | - | 204 | 204 | 18.1 | 245 | 0.831 | 100 | 17.3 | 4 |
| Approach | 869 | 425 | 1294 | 12.8 | | 0.835 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 3285 | 10.4 | 0.835 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

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

**Merge Analysis**

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South Exit: Ti Rakau Drive<br>Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | |
| East Exit: Pakuranga Road (East)<br>Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | |
| West Exit: Pakuranga Road (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | |

# LANE SUMMARY

## Site: 1.0 [1.0 Pakuranga Rd / Ti Rakau Dr (Site Folder: PM)]

## Network: N101 [PM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated    Cycle Time = 130 seconds (Site User-Given Phase Times)

| Lane Use and Performance | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | DEMAND FLOWS [ Total | HV ] | ARRIVAL FLOWS [ Total | HV ] | Cap. | Deg. Satn | Lane Util. | Aver. Delay | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] | Lane Config | Lane Length | Cap. Adj. | Prob. Block. |
| | veh/h | % | veh/h | % | veh/h | v/c | % | sec | | | m | | m | % | % |
| **South: Ti Rakau Drive** | | | | | | | | | | | | | | | |
| Lane 1 | 709 | 14.8 | 709 | 14.8 | 906 [1] | 0.783 | 100 | 11.1 | LOS B | 19.5 | 153.8 | Full | 174 | 0.0 | 3.9 |
| Lane 2 (B) | 13 | 100.0 | 13 | 100.0 | 99 | 0.131 | 100 | 64.7 | LOS E | 0.7 | 8.9 | Short | 16 | 0.0 | NA |
| Lane 3 | 107 | 7.9 | 107 | 7.9 | 70 | 1.521 | 100 | 531.8 | LOS F | 20.4 | 152.9 | Full | 174 | -34.6 [N7] | 3.3 [8] |
| Lane 4 | 107 | 7.9 | 107 | 7.9 | 70 | 1.521 | 100 | 531.8 | LOS F | 20.4 | 152.9 | Short | 40 | -34.6 [N7] | NA |
| Approach | 936 | 14.4 | 936 | 14.4 | | 1.521 | | 130.9 | LOS F | 20.4 | 153.8 | | | | |
| **East: Pakuranga Road (East)** | | | | | | | | | | | | | | | |
| Lane 1 | 377 | 1.3 | 370 | 1.3 | 656 [1] | 0.564 | 100 | 20.0 | LOS B | 10.9 | 77.4 | Short | 21 | 0.0 | NA |
| Lane 2 | 369 | 3.3 | 362 | 3.3 | 652 [1] | 0.555 | 100 | 15.1 | LOS B | 10.5 | 75.8 | Full | 98 | 0.0 | 0.0 |
| Lane 3 | 389 | 6.1 | 382 | 6.1 | 688 | 0.555 | 100 | 34.8 | LOS C | 17.1 | 126.0 | Full | 98 | 0.0 | 38.1 |
| Approach | 1135 | 3.6 | 1115 [N1] | 3.6 | | 0.564 | | 23.5 | LOS C | 17.1 | 126.0 | | | | |
| **West: Pakuranga Road (West)** | | | | | | | | | | | | | | | |
| Lane 1 (B) | 42 | 100.0 | 42 | 100.0 | 63 | 0.672 | 100 | 71.6 | LOS E | 2.6 | 33.6 | Full | 380 | -20.9 [N7] | 0.0 |
| Lane 2 | 586 | 7.3 | 586 | 7.3 | 615 | 0.953 | 100 | 70.6 | LOS E | 44.6 | 331.6 | Full | 380 | -34.6 [N7] | 2.7 |
| Lane 3 | 586 | 7.3 | 586 | 7.3 | 615 | 0.953 | 100 | 70.6 | LOS E | 44.6 | 331.6 | Full | 380 | -34.6 [N7] | 2.7 |
| Lane 4 | 226 | 5.8 | 226 | 5.8 | 259 | 0.869 | 100 | 73.6 | LOS E | 14.2 | 104.1 | Short | 178 | 0.0 | NA |
| Lane 5 | 226 | 5.8 | 226 | 5.8 | 259 | 0.869 | 100 | 73.6 | LOS E | 14.2 | 104.1 | Short | 105 | 0.0 | NA |
| Approach | 1665 | 9.2 | 1665 | 9.2 | | 0.953 | | 71.4 | LOS E | 44.6 | 331.6 | | | | |
| Intersection | 3736 | 8.8 | 3716 [N1] | 8.9 | | 1.521 | | 72.0 | LOS E | 44.6 | 331.6 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
8 Probability of Blockage has been set on the basis of a queue that overflows from a short lane.
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.
N7 The capacity reduction has been determined from the queue blockage probability of a Site further downstream due to intermediate continuous lanes.

| Approach Lane Flows (veh/h) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **South: Ti Rakau Drive** | | | | | | | | | |
| Mov. From S To Exit: | L2 W | R2 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 709 | - | 709 | 14.8 | 906 [1] | 0.783 | 100 | NA | NA |
| Lane 2 | 13 | - | 13 | 100.0 | 99 | 0.131 | 100 | 0.0 | 1 |
| Lane 3 | - | 107 | 107 | 7.9 | 70 | 1.521 | 100 | NA | NA |
| Lane 4 | - | 107 | 107 | 7.9 | 70 | 1.521 | 100 | 100.0 | 3 |

| Approach | 722 | 214 | 936 | 14.4 | | 1.521 | | | |
|---|---|---|---|---|---|---|---|---|---|

East: Pakuranga Road (East)

| Mov. From E To Exit: | L2 S | T1 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 370 | - | 370 | 1.3 | 656 [1] | 0.564 | 100 | 100.0 | 2 |
| Lane 2 | - | 362 | 362 | 3.3 | 652 [1] | 0.555 | 100 | NA | NA |
| Lane 3 | - | 382 | 382 | 6.1 | 688 | 0.555 | 100 | NA | NA |
| Approach | 370 | 744 | 1115 | 3.6 | | 0.564 | | | |

West: Pakuranga Road (West)

| Mov. From W To Exit: | T1 E | R2 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 21 | 21 | 42 | 100.0 | 63 | 0.672 | 100 | NA | NA |
| Lane 2 | 586 | - | 586 | 7.3 | 615 | 0.953 | 100 | NA | NA |
| Lane 3 | 586 | - | 586 | 7.3 | 615 | 0.953 | 100 | NA | NA |
| Lane 4 | - | 226 | 226 | 5.8 | 259 | 0.869 | 100 | 0.0 | 3 |
| Lane 5 | - | 226 | 226 | 5.8 | 259 | 0.869 | 100 | 14.2 | 4 |
| Approach | 1193 | 472 | 1665 | 9.2 | | 0.953 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 3716 | 8.9 | 1.521 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

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

## Merge Analysis

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South Exit: Ti Rakau Drive<br>Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | |
| East Exit: Pakuranga Road (East)<br>Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | |
| West Exit: Pakuranga Road (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | |

# LANE SUMMARY

## Site: 2.1 [2.1 Pakuranga Plaza / Pakuranga Rd (Site Folder: AM)]

## Network: N101 [AM (Network Folder: General)]

Site Category: (None)
Give-Way (Two-Way)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total veh/h | DEMAND FLOWS HV ] % | ARRIVAL FLOWS [ Total veh/h | ARRIVAL FLOWS HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 85% BACK OF QUEUE [ Veh | 85% BACK OF QUEUE Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Pakuranga Road (East) | | | | | | | | | | | | | | | |
| Lane 1 | 680 | 8.7 | 680 | 8.7 | 1823 | 0.373 | 100 | 1.2 | LOS A | 0.0 | 0.0 | Full | 121 | 0.0 | 0.0 |
| Lane 2 | 699 | 5.6 | 699 | 5.6 | 1872 | 0.373 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 121 | 0.0 | 0.0 |
| Approach | 1379 | 7.1 | 1379 | 7.1 | | 0.373 | | 0.6 | NA | 0.0 | 0.0 | | | | |
| West: Pakuranga Road (West) | | | | | | | | | | | | | | | |
| Lane 1 | 497 | 7.9 | 497 | 7.9 | 1845 | 0.269 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 108 | 0.0 | 0.0 |
| Lane 2 | 497 | 7.9 | 497 | 7.9 | 1845 | 0.269 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 108 | 0.0 | 0.0 |
| Approach | 994 | 7.9 | 994 | 7.9 | | 0.269 | | 0.0 | NA | 0.0 | 0.0 | | | | |
| SouthWest: Pakuranga Plaza | | | | | | | | | | | | | | | |
| Lane 1 | 29 | 6.9 | 29 | 6.9 | 687 | 0.042 | 100 | 2.8 | LOS A | 0.1 | 0.8 | Full | 196 | -11.2[N7] | 0.0 |
| Approach | 29 | 6.9 | 29 | 6.9 | | 0.042 | | 2.8 | LOS A | 0.1 | 0.8 | | | | |
| Intersection | 2402 | 7.5 | 2402 | 7.5 | | 0.373 | | 0.4 | NA | 0.1 | 0.8 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N7 The capacity reduction has been determined from the queue blockage probability of a Site further downstream due to intermediate continuous lanes.

**Approach Lane Flows (veh/h)**

East: Pakuranga Road (East)

| Mov. From E To Exit: | L1 SW | T1 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 155 | 525 | 680 | 8.7 | 1823 | 0.373 | 100 | NA | NA |
| Lane 2 | - | 699 | 699 | 5.6 | 1872 | 0.373 | 100 | NA | NA |
| Approach | 155 | 1224 | 1379 | 7.1 | | 0.373 | | | |

West: Pakuranga Road (West)

| Mov. From W To Exit: | T1 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|
| Lane 1 | 497 | 497 | 7.9 | 1845 | 0.269 | 100 | NA | NA |
| Lane 2 | 497 | 497 | 7.9 | 1845 | 0.269 | 100 | NA | NA |
| Approach | 994 | 994 | 7.9 | | 0.269 | | | |

SouthWest: Pakuranga Plaza

| Mov. From SW To Exit: | L3 | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|

| | W | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Lane 1 | 29 | 29 | 6.9 | 687 | 0.042 | 100 | NA | NA |
| Approach | 29 | 29 | 6.9 | | 0.042 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 2402 | 7.5 | 0.373 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

| Merge Analysis | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Exit Lane Number | Short Lane Length | Percent Opng in Lane | Opposing Flow Rate | | Critical Gap | Follow-up Headway | Lane Flow Rate | Capacity | Deg. Satn | Min. Delay | Merge Delay |
| | | m | % | veh/h | pcu/h | sec | sec | veh/h | veh/h | v/c | sec | sec |
| East Exit: Pakuranga Road (East)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| West Exit: Pakuranga Road (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| SouthWest Exit: Pakuranga Plaza<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |

# LANE SUMMARY

## Site: 2.1 [2.1 Pakuranga Plaza / Pakuranga Rd (Site Folder: PM)]

## Network: N101 [PM (Network Folder: General)]

Site Category: (None)
Give-Way (Two-Way)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total | HV ] | ARRIVAL FLOWS [ Total | HV ] | Cap. | Deg. Satn | Lane Util. | Aver. Delay | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] | Lane Config | Lane Length | Cap. Adj. | Prob. Block. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | veh/h | % | veh/h | % | veh/h | v/c | % | sec | | | m | | m | % | % |
| East: Pakuranga Road (East) | | | | | | | | | | | | | | | |
| Lane 1 | 579 | 4.4 | 579 | 4.4 | 1877 | 0.309 | 100 | 0.8 | LOS A | 0.0 | 0.0 | Full | 121 | 0.0 | 0.0 |
| Lane 2 | 589 | 2.6 | 589 | 2.6 | 1908 | 0.309 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 121 | 0.0 | 0.0 |
| Approach | 1168 | 3.5 | 1168 | 3.5 | | 0.309 | | 0.4 | NA | 0.0 | 0.0 | | | | |
| West: Pakuranga Road (West) | | | | | | | | | | | | | | | |
| Lane 1 | 708 | 8.8 | 706 | 8.8 | 1835 | 0.384 | 100 | 0.0 | LOS A | 21.0 [N6] | 157.8 [N6] | Full | 108 | 0.0 | 50.0 [N6] |
| Lane 2 | 708 | 8.8 | 706 | 8.8 | 1835 | 0.384 | 100 | 0.0 | LOS A | 21.0 [N6] | 157.8 [N6] | Full | 108 | 0.0 | 50.0 [N6] |
| Approach | 1415 | 8.8 | 1411 [N1] | 8.8 | | 0.384 | | 0.0 | NA | 21.0 | 157.8 | | | | |
| SouthWest: Pakuranga Plaza | | | | | | | | | | | | | | | |
| Lane 1 | 69 | 7.2 | 69 | 7.2 | 808 | 0.085 | 100 | 2.6 | LOS A | 0.3 | 2.0 | Full | 196 | 0.0 | 0.0 |
| Approach | 69 | 7.2 | 69 | 7.2 | | 0.085 | | 2.6 | LOS A | 0.3 | 2.0 | | | | |
| Intersection | 2652 | 6.4 | 2648 [N1] | 6.4 | | 0.384 | | 0.3 | NA | 21.0 | 157.8 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.
N6 Continuous Lane results determined by Back of Queue values of downstream lanes (proportional to lane movement flows) but average back of queue has been restricted to the available queue storage space.

**Approach Lane Flows (veh/h)**

East: Pakuranga Road (East)

| Mov. From E To Exit: | L1 SW | T1 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 91 | 488 | 579 | 4.4 | 1877 | 0.309 | 100 | NA | NA |
| Lane 2 | - | 589 | 589 | 2.6 | 1908 | 0.309 | 100 | NA | NA |
| Approach | 91 | 1077 | 1168 | 3.5 | | 0.309 | | | |

West: Pakuranga Road (West)

| Mov. From W To Exit: | T1 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|
| Lane 1 | 706 | 706 | 8.8 | 1835 | 0.384 | 100 | NA | NA |
| Lane 2 | 706 | 706 | 8.8 | 1835 | 0.384 | 100 | NA | NA |
| Approach | 1411 | 1411 | 8.8 | | 0.384 | | | |

SouthWest: Pakuranga Plaza

| Mov. | L3 | Total | %HV | Deg. | Lane | Prob. | Ov. |
|---|---|---|---|---|---|---|---|

| From SW To Exit: | W | | | Cap. veh/h | Satn v/c | Util. % | SL Ov. % | Lane No. |
|---|---|---|---|---|---|---|---|---|
| Lane 1 | 69 | 69 | 7.2 | 808 | 0.085 | 100 | NA | NA |
| Approach | 69 | 69 | 7.2 | | 0.085 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 2648 | 6.4 | 0.384 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

**Merge Analysis**

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| East Exit: Pakuranga Road (East) Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| West Exit: Pakuranga Road (West) Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| SouthWest Exit: Pakuranga Plaza Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |

# LANE SUMMARY

## Site: 3.0 [3.0 Pakuranga Highway / Pakuranga Rd (Site Folder: AM)]

## Network: N101 [AM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 80 seconds (Site Practical Cycle Time)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **East: Pakuranga Road (East)** | | | | | | | | | | | | | | | |
| Lane 1 | 683 | 5.2 | 683 | 5.2 | 757 | 0.902 | 100 | 41.5 | LOS D | 28.8 | 210.4 | Full | 183 | 0.0 | 27.7 |
| Lane 2 | 683 | 5.2 | 683 | 5.2 | 757 | 0.902 | 100 | 41.5 | LOS D | 28.8 | 210.4 | Full | 183 | 0.0 | 27.7 |
| Lane 3 | 534 | 7.2 | 534 | 7.2 | 583 [1] | 0.916 | 100 | 45.3 | LOS D | 22.3 | 165.9 | Full | 183 | 0.0 | 6.1 [8] |
| Lane 4 | 535 | 7.2 | 535 | 7.2 | 583 [1] | 0.916 | 100 | 45.3 | LOS D | 22.3 | 165.9 | Short | 60 | 0.0 | NA |
| Approach | 2434 | 6.1 | 2434 | 6.1 | | 0.916 | | 43.2 | LOS D | 28.8 | 210.4 | | | | |
| **NorthWest: Pakuranga Road (West)** | | | | | | | | | | | | | | | |
| Lane 1 | 369 | 9.2 | 369 | 9.2 | 737 | 0.501 | 100 | 22.3 | LOS C | 9.6 | 72.7 | Full | 121 | 0.0 | 0.0 |
| Lane 2 | 375 | 6.9 | 375 | 6.9 | 748 | 0.501 | 100 | 22.3 | LOS C | 9.8 | 72.4 | Full | 121 | 0.0 | 0.0 |
| Lane 3 | 241 | 7.5 | 241 | 7.5 | 351 | 0.687 | 100 | 38.7 | LOS D | 8.3 | 61.8 | Short | 98 | 0.0 | NA |
| Approach | 985 | 7.9 | 985 | 7.9 | | 0.687 | | 26.3 | LOS C | 9.8 | 72.7 | | | | |
| **SouthWest: Flyover** | | | | | | | | | | | | | | | |
| Lane 1 | 314 | 6.7 | 314 | 6.7 | 364 | 0.863 | 100 | 48.1 | LOS D | 12.6 | 93.2 | Short | 70 | 0.0 | NA |
| Lane 2 | 264 | 5.3 | 264 | 5.3 | 307 | 0.857 | 100 | 48.0 | LOS D | 10.5 | 76.8 | Full | 1162 | 0.0 | 0.0 |
| Lane 3 | 264 | 5.3 | 264 | 5.3 | 307 | 0.857 | 100 | 48.0 | LOS D | 10.5 | 76.8 | Full | 1162 | 0.0 | 0.0 |
| Approach | 841 | 5.8 | 841 | 5.8 | | 0.863 | | 48.0 | LOS D | 12.6 | 93.2 | | | | |
| Intersection | 4260 | 6.5 | 4260 | 6.5 | | 0.916 | | 40.2 | LOS D | 28.8 | 210.4 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
8 Probability of Blockage has been set on the basis of a queue that overflows from a short lane.

**Approach Lane Flows (veh/h)**

East: Pakuranga Road (East)

| Mov. From E To Exit: | L1 SW | R1 NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 683 | - | 683 | 5.2 | 757 | 0.902 | 100 | NA | NA |
| Lane 2 | 683 | - | 683 | 5.2 | 757 | 0.902 | 100 | NA | NA |
| Lane 3 | - | 534 | 534 | 7.2 | 583 [1] | 0.916 | 100 | NA | NA |
| Lane 4 | - | 535 | 535 | 7.2 | 583 [1] | 0.916 | 100 | 100.0 | 3 |
| Approach | 1365 | 1069 | 2434 | 6.1 | | 0.916 | | | |

NorthWest: Pakuranga Road (West)

| Mov. From NW To Exit: | L1 E | R2 SW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 369 | - | 369 | 9.2 | 737 | 0.501 | 100 | NA | NA |

| Mov. From SW To Exit: | L2 NW | R1 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 2 | 375 | - | 375 | 6.9 | 748 | 0.501 | 100 | NA | NA |
| Lane 3 | - | 241 | 241 | 7.5 | 351 | 0.687 | 100 | 0.0 | 2 |
| Approach | 744 | 241 | 985 | 7.9 | | 0.687 | | | |
| **SouthWest: Flyover** | | | | | | | | | |
| Lane 1 | 314 | - | 314 | 6.7 | 364 | 0.863 | 100 | 41.3 | 2 |
| Lane 2 | - | 264 | 264 | 5.3 | 307 | 0.857 | 100 | NA | NA |
| Lane 3 | - | 264 | 264 | 5.3 | 307 | 0.857 | 100 | NA | NA |
| Approach | 314 | 527 | 841 | 5.8 | | 0.863 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 4260 | 6.5 | 0.916 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

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

## Merge Analysis

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | Opposing Flow Rate pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **East Exit: Pakuranga Road (East)**<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | | |
| **NorthWest Exit: Pakuranga Road (West)**<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| **SouthWest Exit: Flyover**<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |

# LANE SUMMARY

## Site: 3.0 [3.0 Pakuranga Highway / Pakuranga Rd (Site Folder: PM)]

## Network: N101 [PM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated    Cycle Time = 120 seconds (Site User-Given Phase Times)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **East: Pakuranga Road (East)** | | | | | | | | | | | | | | | |
| Lane 1 | 378 | 4.2 | 378 | 4.2 | 924 | 0.409 | 100 | 16.0 | LOS B | 9.3 | 67.3 | Full | 183 | 0.0 | 0.0 |
| Lane 2 | 378 | 4.2 | 378 | 4.2 | 924 | 0.409 | 100 | 16.0 | LOS B | 9.3 | 67.3 | Full | 183 | 0.0 | 0.0 |
| Lane 3 | 382 | 4.7 | 382 | 4.7 | 544[1] | 0.701 | 100 | 36.1 | LOS D | 15.9 | 115.9 | Full | 183 | 0.0 | 0.0 |
| Lane 4 | 382 | 4.7 | 382 | 4.7 | 544[1] | 0.701 | 100 | 36.1 | LOS D | 15.9 | 115.9 | Short | 60 | 0.0 | NA |
| Approach | 1519 | 4.5 | 1519 | 4.5 | | 0.701 | | 26.1 | LOS C | 15.9 | 115.9 | | | | |
| **NorthWest: Pakuranga Road (West)** | | | | | | | | | | | | | | | |
| Lane 1 | 668 | 9.4 | 668 | 9.4 | 654 | 1.021 | 100 | 107.2 | LOS F | 23.4[N4] | 176.8[N4] | Full | 121 | 0.0 | 50.0 |
| Lane 2 | 639 | 6.5 | 639 | 6.5 | 626[1] | 1.021 | 100 | 108.0 | LOS F | 23.9[N4] | 176.8[N4] | Full | 121 | 0.0 | 50.0 |
| Lane 3 | 102 | 19.6 | 102 | 19.6 | 122 | 0.839 | 100 | 73.2 | LOS E | 6.0 | 48.8 | Short | 98 | 0.0 | NA |
| Approach | 1409 | 8.8 | 1409 | 8.8 | | 1.021 | | 105.1 | LOS F | 23.9 | 176.8 | | | | |
| **SouthWest: Flyover** | | | | | | | | | | | | | | | |
| Lane 1 | 414 | 0.7 | 414 | 0.7 | 632 | 0.655 | 100 | 26.3 | LOS C | 12.4 | 87.1 | Short | 70 | 0.0 | NA |
| Lane 2 | 611 | 2.3 | 611 | 2.3 | 625[1] | 0.978 | 100 | 78.8 | LOS E | 40.8 | 291.5 | Full | 1162 | 0.0 | 0.0 |
| Lane 3 | 834 | 2.3 | 834 | 2.3 | 853 | 0.978 | 100 | 77.6 | LOS E | 60.3 | 430.7 | Full | 1162 | 0.0 | 0.0 |
| Approach | 1859 | 1.9 | 1859 | 1.9 | | 0.978 | | 66.5 | LOS E | 60.3 | 430.7 | | | | |
| Intersection | 4787 | 4.8 | 4787 | 4.8 | | 1.021 | | 65.1 | LOS E | 60.3 | 430.7 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
N4 Average back of queue has been restricted to the available queue storage space.

**Approach Lane Flows (veh/h)**

East: Pakuranga Road (East)

| Mov. From E To Exit: | L1 SW | R1 NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 378 | - | 378 | 4.2 | 924 | 0.409 | 100 | NA | NA |
| Lane 2 | 378 | - | 378 | 4.2 | 924 | 0.409 | 100 | NA | NA |
| Lane 3 | - | 382 | 382 | 4.7 | 544[1] | 0.701 | 100 | NA | NA |
| Lane 4 | - | 382 | 382 | 4.7 | 544[1] | 0.701 | 100 | 76.7 | 3 |
| Approach | 756 | 763 | 1519 | 4.5 | | 0.701 | | | |

NorthWest: Pakuranga Road (West)

| Mov. From NW To Exit: | L1 E | R2 SW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 668 | - | 668 | 9.4 | 654 | 1.021 | 100 | NA | NA |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Lane 2 | 639 | - | 639 | 6.5 | 626[1] | 1.021 | 100 | NA | NA |
| Lane 3 | - | 102 | 102 | 19.6 | 122 | 0.839 | 100 | 0.0 | 2 |
| Approach | 1307 | 102 | 1409 | 8.8 | | 1.021 | | | |

SouthWest: Flyover

| Mov. From SW To Exit: | L2 NW | R1 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 414 | - | 414 | 0.7 | 632 | 0.655 | 100 | 35.0 | 2 |
| Lane 2 | - | 611 | 611 | 2.3 | 625[1] | 0.978 | 100 | NA | NA |
| Lane 3 | - | 834 | 834 | 2.3 | 853 | 0.978 | 100 | NA | NA |
| Approach | 414 | 1445 | 1859 | 1.9 | | 0.978 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 4787 | 4.8 | 1.021 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

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

## Merge Analysis

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | Opposing Flow Rate pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| East Exit: Pakuranga Road (East)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | | |
| NorthWest Exit: Pakuranga Road (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| SouthWest Exit: Flyover<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |

# LANE SUMMARY

## Site: 7.4 [7.4 Reeves Rd/ Aylesbury St - XL (Site Folder: AM)]

## Network: N101 [AM (Network Folder: General)]

New Site
Site Category: (None)
Give-Way (Two-Way)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total | HV ] | ARRIVAL FLOWS [ Total | HV ] | Cap. | Deg. Satn | Lane Util. | Aver. Delay | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] | Lane Config | Lane Length | Cap. Adj. | Prob. Block. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | veh/h | % | veh/h | % | veh/h | v/c | % | sec | | | m | | m | % | % |
| **East: Reeves Rd (North)** | | | | | | | | | | | | | | | |
| Lane 1 | 29 | 0.0 | 29 | 0.0 | 2014 | 0.015 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 55 | 0.0 | 0.0 |
| Lane 2 | 45 | 0.0 | 45 | 0.0 | 1783 | 0.025 | 100 | 4.1 | LOS A | 0.1 | 0.6 | Short | 53 | 0.0 | NA |
| Approach | 75 | 0.0 | 75 | 0.0 | | 0.025 | | 2.5 | NA | 0.1 | 0.6 | | | | |
| **North: Aylesbury St** | | | | | | | | | | | | | | | |
| Lane 1 | 24 | 0.0 | 24 | 0.0 | 1341 | 0.018 | 100 | 4.8 | LOS A | 0.1 | 0.4 | Full | 193 | 0.0 | 0.0 |
| Approach | 24 | 0.0 | 24 | 0.0 | | 0.018 | | 4.8 | LOS A | 0.1 | 0.4 | | | | |
| **West: Reeves Rd (South)** | | | | | | | | | | | | | | | |
| Lane 1 | 12 | 0.0 | 12 | 0.0 | 2032 | 0.006 | 100 | 0.4 | LOS A | 0.0 | 0.0 | Full | 60 | 0.0 | 0.0 |
| Approach | 12 | 0.0 | 12 | 0.0 | | 0.006 | | 0.4 | NA | 0.0 | 0.0 | | | | |
| Intersection | 111 | 0.0 | 111 | 0.0 | | 0.025 | | 2.8 | NA | 0.1 | 0.6 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

**Approach Lane Flows (veh/h)**

East: Reeves Rd (North)

| Mov. From E To Exit: | T1 W | R2 N | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 29 | - | 29 | 0.0 | 2014 | 0.015 | 100 | NA | NA |
| Lane 2 | - | 45 | 45 | 0.0 | 1783 | 0.025 | 100 | 0.0 | 1 |
| Approach | 29 | 45 | 75 | 0.0 | | 0.025 | | | |

North: Aylesbury St

| Mov. From N To Exit: | L2 E | R2 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 14 | 11 | 24 | 0.0 | 1341 | 0.018 | 100 | NA | NA |
| Approach | 14 | 11 | 24 | 0.0 | | 0.018 | | | |

West: Reeves Rd (South)

| Mov. From W To Exit: | L2 N | T1 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 1 | 11 | 12 | 0.0 | 2032 | 0.006 | 100 | NA | NA |
| Approach | 1 | 11 | 12 | 0.0 | | 0.006 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 111 | 0.0 | 0.025 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

| Merge Analysis | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| East Exit: Reeves Rd (North)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| North Exit: Aylesbury St<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| West Exit: Reeves Rd (South)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |

# LANE SUMMARY

## Site: 7.4 [7.4 Reeves Rd/ Aylesbury St - XL (Site Folder: PM)] Network: N101 [PM (Network Folder: General)]

New Site
Site Category: (None)
Give-Way (Two-Way)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Reeves Rd (North) | | | | | | | | | | | | | | | |
| Lane 1 | 13 | 0.0 | 13 | 0.0 | 2009 | 0.006 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 55 | 0.0 | 0.0 |
| Lane 2 | 16 | 0.0 | 16 | 0.0 | 1735 | 0.009 | 100 | 4.2 | LOS A | 0.0 | 0.2 | Short | 53 | 0.0 | NA |
| Approach | 28 | 0.0 | 28 | 0.0 | | 0.009 | | 2.3 | NA | 0.0 | 0.2 | | | | |
| North: Aylesbury St | | | | | | | | | | | | | | | |
| Lane 1 | 104 | 0.0 | 104 | 0.0 | 1351 | 0.077 | 100 | 4.8 | LOS A | 0.2 | 1.6 | Full | 193 | 0.0 | 0.0 |
| Approach | 104 | 0.0 | 104 | 0.0 | | 0.077 | | 4.8 | LOS A | 0.2 | 1.6 | | | | |
| West: Reeves Rd (South) | | | | | | | | | | | | | | | |
| Lane 1 | 43 | 0.0 | 43 | 0.0 | 2039 | 0.021 | 100 | 0.1 | LOS A | 0.0 | 0.0 | Full | 60 | 0.0 | 0.0 |
| Approach | 43 | 0.0 | 43 | 0.0 | | 0.021 | | 0.1 | NA | 0.0 | 0.0 | | | | |
| Intersection | 176 | 0.0 | 176 | 0.0 | | 0.077 | | 3.2 | NA | 0.2 | 1.6 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

**Approach Lane Flows (veh/h)**

East: Reeves Rd (North)

| Mov. From E To Exit: | T1 W | R2 N | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 13 | - | 13 | 0.0 | 2009 | 0.006 | 100 | NA | NA |
| Lane 2 | - | 16 | 16 | 0.0 | 1735 | 0.009 | 100 | 0.0 | 1 |
| Approach | 13 | 16 | 28 | 0.0 | | 0.009 | | | |

North: Aylesbury St

| Mov. From N To Exit: | L2 E | R2 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 62 | 42 | 104 | 0.0 | 1351 | 0.077 | 100 | NA | NA |
| Approach | 62 | 42 | 104 | 0.0 | | 0.077 | | | |

West: Reeves Rd (South)

| Mov. From W To Exit: | L2 N | T1 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 1 | 42 | 43 | 0.0 | 2039 | 0.021 | 100 | NA | NA |
| Approach | 1 | 42 | 43 | 0.0 | | 0.021 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 176 | 0.0 | 0.077 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

| Merge Analysis | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| East Exit: Reeves Rd (North)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| North Exit: Aylesbury St<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| West Exit: Reeves Rd (South)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |

# LANE SUMMARY

## Site: 7.3 [7.3 William Roberts Rd / Reeves Rd - XL (Site Folder: AM)]

## Network: N101 [AM (Network Folder: General)]

Site Category: (None)
Give-Way (Two-Way)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: William Roberts Road (South) | | | | | | | | | | | | | | | |
| Lane 1 | 134 | 8.7 | 134 | 8.7 | 950 | 0.141 | 100 | 5.6 | LOS A | 0.4 | 2.8 | Full | 243 | 0.0 | 0.0 |
| Approach | 134 | 8.7 | 134 | 8.7 | | 0.141 | | 5.6 | LOS A | 0.4 | 2.8 | | | | |
| East: Reeves Rd (East) | | | | | | | | | | | | | | | |
| Lane 1 | 283 | 8.2 | 283 | 8.2 | 1743 | 0.162 | 100 | 4.4 | LOS A | 0.0 | 0.0 | Full | 266 | 0.0 | 0.0 |
| Approach | 283 | 8.2 | 283 | 8.2 | | 0.162 | | 4.4 | NA | 0.0 | 0.0 | | | | |
| West: Reeves Rd (West) | | | | | | | | | | | | | | | |
| Lane 1 | 15 | 7.1 | 15 | 7.1 | 1873 | 0.008 | 100 | 2.7 | LOS A | 0.0 | 0.0 | Full | 55 | 0.0 | 0.0 |
| Lane 2 | 14 | 15.4 | 14 | 15.4 | 635 | 0.022 | 100 | 6.8 | LOS A | 0.1 | 0.4 | Short | 13 | 0.0 | NA |
| Approach | 28 | 11.1 | 28 | 11.1 | | 0.022 | | 4.7 | LOS A | 0.1 | 0.4 | | | | |
| Intersection | 445 | 8.5 | 445 | 8.5 | | 0.162 | | 4.8 | NA | 0.4 | 2.8 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

**Approach Lane Flows (veh/h)**

South: William Roberts Road (South)

| Mov. From S To Exit: | L2 W | R2 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 24 | 109 | 134 | 8.7 | 950 | 0.141 | 100 | NA | NA |
| Approach | 24 | 109 | 134 | 8.7 | | 0.141 | | | |

East: Reeves Rd (East)

| Mov. From E To Exit: | L2 S | T1 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 229 | 54 | 283 | 8.2 | 1743 | 0.162 | 100 | NA | NA |
| Approach | 229 | 54 | 283 | 8.2 | | 0.162 | | | |

West: Reeves Rd (West)

| Mov. From W To Exit: | T1 E | R2 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 15 | - | 15 | 7.1 | 1873 | 0.008 | 100 | NA | NA |
| Lane 2 | - | 14 | 14 | 15.4 | 635 | 0.022 | 100 | 0.0 | 1 |
| Approach | 15 | 14 | 28 | 11.1 | | 0.022 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 445 | 8.5 | 0.162 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

| Merge Analysis | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South Exit: William Roberts Road (South)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| East Exit: Reeves Rd (East)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| West Exit: Reeves Rd (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |

# LANE SUMMARY

## Site: 7.3 [7.3 William Roberts Rd / Reeves Rd - XL (Site Folder: PM)]

## Network: N101 [PM (Network Folder: General)]

Site Category: (None)
Give-Way (Two-Way)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: William Roberts Road (South) | | | | | | | | | | | | | | | |
| Lane 1 | 323 | 14.3 | 323 | 14.4 | 972 | 0.332 | 100 | 5.4 | LOS A | 1.1 | 8.6 | Full | 243 | 0.0 | 0.0 |
| Approach | 323 | 14.3 | 323 | 14.4 | | 0.332 | | 5.4 | LOS A | 1.1 | 8.6 | | | | |
| East: Reeves Rd (East) | | | | | | | | | | | | | | | |
| Lane 1 | 112 | 6.6 | 112 | 6.6 | 1750 | 0.064 | 100 | 4.5 | LOS A | 0.0 | 0.0 | Full | 266 | 0.0 | 0.0 |
| Approach | 112 | 6.6 | 112 | 6.6 | | 0.064 | | 4.5 | NA | 0.0 | 0.0 | | | | |
| West: Reeves Rd (West) | | | | | | | | | | | | | | | |
| Lane 1 | 37 | 5.7 | 37 | 5.7 | 1890 | 0.019 | 100 | 2.7 | LOS A | 0.0 | 0.0 | Full | 55 | 0.0 | 0.0 |
| Lane 2 | 75 | 7.0 | 75 | 7.0 | 649 | 0.115 | 100 | 7.1 | LOS A | 0.3 | 2.1 | Short | 13 | 0.0 | NA |
| Approach | 112 | 6.6 | 112 | 6.6 | | 0.115 | | 5.7 | LOS A | 0.3 | 2.1 | | | | |
| Intersection | 546 | 11.2 | 546 | 11.2 | | 0.332 | | 5.3 | NA | 1.1 | 8.6 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

**Approach Lane Flows (veh/h)**

South: William Roberts Road (South)

| Mov. From S To Exit: | L2 W | R2 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 23 | 299 | 323 | 14.4 | 972 | 0.332 | 100 | NA | NA |
| Approach | 23 | 299 | 323 | 14.4 | | 0.332 | | | |

East: Reeves Rd (East)

| Mov. From E To Exit: | L2 S | T1 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 105 | 6 | 112 | 6.6 | 1750 | 0.064 | 100 | NA | NA |
| Approach | 105 | 6 | 112 | 6.6 | | 0.064 | | | |

West: Reeves Rd (West)

| Mov. From W To Exit: | T1 E | R2 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 37 | - | 37 | 5.7 | 1890 | 0.019 | 100 | NA | NA |
| Lane 2 | - | 75 | 75 | 7.0 | 649 | 0.115 | 100 | 0.0 | 1 |
| Approach | 37 | 75 | 112 | 6.6 | | 0.115 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 546 | 11.2 | 0.332 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

| Merge Analysis | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | Opposing Flow Rate pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South Exit: William Roberts Road (South)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| East Exit: Reeves Rd (East)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| West Exit: Reeves Rd (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |

# LANE SUMMARY

## Site: 7.1 [7.1 William Roberts Rd / Cortina Pl (Site Folder: AM)]

## Network: N101 [AM (Network Folder: General)]

Site Category: (None)
Give-Way (Two-Way)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NorthEast: William Roberts Road (North) | | | | | | | | | | | | | | | |
| Lane 1 | 267 | 8.3 | 267 | 8.3 | 1831 | 0.146 | 100 | 0.2 | LOS A | 0.1 | 0.5 | Full | 243 | 0.0 | 0.0 |
| Approach | 267 | 8.3 | 267 | 8.3 | | 0.146 | | 0.2 | NA | 0.1 | 0.5 | | | | |
| NorthWest: Cortina Place | | | | | | | | | | | | | | | |
| Lane 1 | 37 | 5.4 | 37 | 5.4 | 1136 | 0.033 | 100 | 3.0 | LOS A | 0.1 | 0.7 | Full | 177 | 0.0 | 0.0 |
| Approach | 37 | 5.4 | 37 | 5.4 | | 0.033 | | 3.0 | LOS A | 0.1 | 0.7 | | | | |
| SouthWest: William Roberts Road (South) | | | | | | | | | | | | | | | |
| Lane 1 | 97 | 7.2 | 97 | 7.2 | 1792 | 0.054 | 100 | 0.5 | LOS A | 0.0 | 0.0 | Full | 110 | 0.0 | 0.0 |
| Approach | 97 | 7.2 | 97 | 7.2 | | 0.054 | | 0.5 | NA | 0.0 | 0.0 | | | | |
| Intersection | 401 | 7.7 | 401 | 7.7 | | 0.146 | | 0.5 | NA | 0.1 | 0.7 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

**Approach Lane Flows (veh/h)**

NorthEast: William Roberts Road (North)

| Mov. From NE To Exit: | T1 SW | R2 NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 257 | 10 | 267 | 8.3 | 1831 | 0.146 | 100 | NA | NA |
| Approach | 257 | 10 | 267 | 8.3 | | 0.146 | | | |

NorthWest: Cortina Place

| Mov. From NW To Exit: | L2 NE | R2 SW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 19 | 18 | 37 | 5.4 | 1136 | 0.033 | 100 | NA | NA |
| Approach | 19 | 18 | 37 | 5.4 | | 0.033 | | | |

SouthWest: William Roberts Road (South)

| Mov. From SW To Exit: | L2 NW | T1 NE | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 23 | 74 | 97 | 7.2 | 1792 | 0.054 | 100 | NA | NA |
| Approach | 23 | 74 | 97 | 7.2 | | 0.054 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| Intersection | 401 | 7.7 | | 0.146 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

**Merge Analysis**

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | Opposing Flow Rate pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NorthEast Exit: William Roberts Road (North)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| NorthWest Exit: Cortina Place<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| SouthWest Exit: William Roberts Road (South)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |

# LANE SUMMARY

## ▽ Site: 7.1 [7.1 William Roberts Rd / Cortina Pl (Site Folder: PM)]

## Network: N101 [PM (Network Folder: General)]

Site Category: (None)
Give-Way (Two-Way)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NorthEast: William Roberts Road (North) | | | | | | | | | | | | | | | |
| Lane 1 | 141 | 10.0 | 141 | 10.0 | 1754 | 0.080 | 100 | 0.5 | LOS A | 0.1 | 0.6 | Full | 243 | 0.0 | 0.0 |
| Approach | 141 | 10.0 | 141 | 10.0 | | 0.080 | | 0.5 | NA | 0.1 | 0.6 | | | | |
| NorthWest: Cortina Place | | | | | | | | | | | | | | | |
| Lane 1 | 64 | 6.3 | 64 | 6.3 | 898 | 0.071 | 100 | 4.2 | LOS A | 0.2 | 1.4 | Full | 177 | 0.0 | 0.0 |
| Approach | 64 | 6.3 | 64 | 6.3 | | 0.071 | | 4.2 | LOS A | 0.2 | 1.4 | | | | |
| SouthWest: William Roberts Road (South) | | | | | | | | | | | | | | | |
| Lane 1 | 367 | 10.9 | 366 | 10.9 | 1762 | 0.208 | 100 | 0.3 | LOS A | 0.0 | 0.0 | Full | 110 | 0.0 | 0.0 |
| Approach | 367 | 10.9 | 366 N1 | 10.9 | | 0.208 | | 0.3 | NA | 0.0 | 0.0 | | | | |
| Intersection | 572 | 10.1 | 571 N1 | 10.2 | | 0.208 | | 0.8 | NA | 0.2 | 1.4 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

**Approach Lane Flows (veh/h)**

NorthEast: William Roberts Road (North)

| Mov. From NE To Exit: | T1 SW | R2 NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 131 | 10 | 141 | 10.0 | 1754 | 0.080 | 100 | NA | NA |
| Approach | 131 | 10 | 141 | 10.0 | | 0.080 | | | |

NorthWest: Cortina Place

| Mov. From NW To Exit: | L2 NE | R2 SW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 19 | 45 | 64 | 6.3 | 898 | 0.071 | 100 | NA | NA |
| Approach | 19 | 45 | 64 | 6.3 | | 0.071 | | | |

SouthWest: William Roberts Road (South)

| Mov. From SW To Exit: | L2 NW | T1 NE | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 48 | 318 | 366 | 10.9 | 1762 | 0.208 | 100 | NA | NA |
| Approach | 48 | 318 | 366 | 10.9 | | 0.208 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|

| | | | |
|---|---|---|---|
| Intersection | 571 | 10.2 | 0.208 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

**Merge Analysis**

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | Opposing Flow Rate pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NorthEast Exit: William Roberts Road (North)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| NorthWest Exit: Cortina Place<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| SouthWest Exit: William Roberts Road (South)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |

# LANE SUMMARY

## Site: 4.0 [4.0 Palm Ave / Aylesbury St (Site Folder: AM)]

## Network: N101 [AM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated   Cycle Time = 70 seconds (Site Practical Cycle Time)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total | HV ] | ARRIVAL FLOWS [ Total | HV ] | Cap. | Deg. Satn | Lane Util. | Aver. Delay | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] | Lane Config | Lane Length | Cap. Adj. | Prob. Block. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | veh/h | % | veh/h | % | veh/h | v/c | % | sec | | | m | | m | % | % |
| South: Ti Rakau Drive (East) | | | | | | | | | | | | | | | |
| Lane 1 | 314 | 12.1 | 314 | 12.1 | 403 | 0.781 | 100 | 31.3 | LOS C | 10.1 | 78.2 | Full | 110 | -11.5 N3 | 0.0 |
| Lane 2 | 359 | 12.6 | 359 | 12.6 | 459 | 0.781 | 100 | 30.6 | LOS C | 11.4 | 88.3 | Full | 110 | 0.0 | 0.0 |
| Approach | 673 | 12.3 | 673 | 12.3 | | 0.781 | | 30.9 | LOS C | 11.4 | 88.3 | | | | |
| East: Aylesbury Street | | | | | | | | | | | | | | | |
| Lane 1 | 32 | 6.3 | 32 | 6.3 | 148 | 0.217 | 100 | 36.5 | LOS D | 1.0 | 7.2 | Short | 30 | 0.0 | NA |
| Lane 2 | 53 | 5.7 | 53 | 5.7 | 153 | 0.347 | 100 | 36.8 | LOS D | 1.7 | 12.1 | Full | 40 | 0.0 | 0.0 |
| Approach | 85 | 5.9 | 85 | 5.9 | | 0.347 | | 36.7 | LOS D | 1.7 | 12.1 | | | | |
| North: Ti Rakau Drive (West) | | | | | | | | | | | | | | | |
| Lane 1 | 275 | 16.9 | 275 | 16.9 | 365 | 0.752 | 100 | 32.4 | LOS C | 8.7 | 69.8 | Full | 174 | 0.0 | 0.0 |
| Lane 2 | 283 | 18.5 | 282 | 18.5 | 375 | 0.752 | 100 | 31.7 | LOS C | 8.9 | 72.4 | Full | 174 | 0.0 | 0.0 |
| Approach | 558 | 17.7 | 557 N1 | 17.7 | | 0.752 | | 32.1 | LOS C | 8.9 | 72.4 | | | | |
| West: Palm Avenue | | | | | | | | | | | | | | | |
| Lane 1 | 121 | 4.1 | 121 | 4.1 | 165 | 0.732 | 100 | 42.1 | LOS D | 4.1 | 29.4 | Full | 87 | -9.6 N3 | 0.0 |
| Approach | 121 | 4.1 | 121 | 4.1 | | 0.732 | | 42.1 | LOS D | 4.1 | 29.4 | | | | |
| Intersection | 1437 | 13.4 | 1436 N1 | 13.4 | | 0.781 | | 32.6 | LOS C | 11.4 | 88.3 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.
N3 Capacity Adjustment due to downstream lane blockage determined by the program.

**Approach Lane Flows (veh/h)**

South: Ti Rakau Drive (East)

| Mov. From S To Exit: | L2 W | T1 N | R2 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 33 | 281 | - | 314 | 12.1 | 403 | 0.781 | 100 | NA | NA |
| Lane 2 | - | 329 | 30 | 359 | 12.6 | 459 | 0.781 | 100 | NA | NA |
| Approach | 33 | 610 | 30 | 673 | 12.3 | | 0.781 | | | |

East: Aylesbury Street

| Mov. From E To Exit: | L2 S | T1 W | R2 N | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 32 | - | - | 32 | 6.3 | 148 | 0.217 | 100 | 0.0 | 2 |
| Lane 2 | - | 10 | 43 | 53 | 5.7 | 153 | 0.347 | 100 | NA | NA |
| Approach | 32 | 10 | 43 | 85 | 5.9 | | 0.347 | | | |

| North: Ti Rakau Drive (West) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mov. From N To Exit: | L2 E | T1 S | R2 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 61 | 214 | - | 275 | 16.9 | 365 | 0.752 | 100 | NA | NA |
| Lane 2 | - | 257 | 25 | 282 | 18.5 | 375 | 0.752 | 100 | NA | NA |
| Approach | 61 | 471 | 25 | 557 | 17.7 | | 0.752 | | | |

| West: Palm Avenue | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Mov. From W To Exit: | L2 N | T1 E | R2 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 89 | 10 | 22 | 121 | 4.1 | 165 | 0.732 | 100 | NA | NA |
| Approach | 89 | 10 | 22 | 121 | 4.1 | | 0.732 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 1436 | 13.4 | 0.781 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

**Merge Analysis**

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | Opposing Flow Rate pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South Exit: Ti Rakau Drive (East) Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| East Exit: Aylesbury Street Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| North Exit: Ti Rakau Drive (West) Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| West Exit: Palm Avenue Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |

# LANE SUMMARY

## Site: 4.0 [4.0 Palm Ave / Aylesbury St (Site Folder: PM)]

## Network: N101 [PM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated    Cycle Time = 90 seconds (Site Practical Cycle Time)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **South: Ti Rakau Drive (East)** | | | | | | | | | | | | | | | |
| Lane 1 | 390 | 16.9 | 390 | 16.9 | 481 | 0.810 | 100 | 37.9 | LOS D | 15.9 | 127.3 | Full | 110 | -3.5 N3 | 28.4 |
| Lane 2 | 407 | 17.0 | 407 | 17.0 | 503 | 0.810 | 100 | 37.5 | LOS D | 16.5 | 132.4 | Full | 110 | 0.0 | 32.0 |
| Approach | 797 | 16.9 | 797 | 16.9 | | 0.810 | | 37.7 | LOS D | 16.5 | 132.4 | | | | |
| **East: Aylesbury Street** | | | | | | | | | | | | | | | |
| Lane 1 | 64 | 10.9 | 64 | 10.9 | 159 | 0.402 | 100 | 45.5 | LOS D | 2.5 | 19.2 | Short | 30 | -4.5 N3 | NA |
| Lane 2 | 153 | 3.3 | 153 | 3.3 | 180 | 0.849 | 100 | 53.4 | LOS D | 6.8 | 49.1 | Full | 40 | 0.0 | 33.8 |
| Approach | 217 | 5.5 | 217 | 5.5 | | 0.849 | | 51.0 | LOS D | 6.8 | 49.1 | | | | |
| **North: Ti Rakau Drive (West)** | | | | | | | | | | | | | | | |
| Lane 1 | 419 | 6.3 | 415 | 6.4 | 496 | 0.836 | 100 | 40.4 | LOS D | 17.5 | 129.1 | Full | 174 | -4.0 N3 | 0.0 |
| Lane 2 | 424 | 5.8 | 421 | 5.8 | 503 | 0.836 | 100 | 40.4 | LOS D | 17.7 | 130.0 | Full | 174 | -3.9 N3 | 0.0 |
| Approach | 843 | 6.0 | 836 N1 | 6.1 | | 0.836 | | 40.4 | LOS D | 17.7 | 130.0 | | | | |
| **West: Palm Avenue** | | | | | | | | | | | | | | | |
| Lane 1 | 95 | 5.3 | 95 | 5.3 | 117 | 0.813 | 100 | 56.6 | LOS E | 4.2 | 30.8 | Full | 87 | -3.6 N3 | 0.0 |
| Approach | 95 | 5.3 | 95 | 5.3 | | 0.813 | | 56.6 | LOS E | 4.2 | 30.8 | | | | |
| Intersection | 1952 | 10.4 | 1945 N1 | 10.4 | | 0.849 | | 41.3 | LOS D | 17.7 | 132.4 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.
N3 Capacity Adjustment due to downstream lane blockage determined by the program.

**Approach Lane Flows (veh/h)**

South: Ti Rakau Drive (East)

| Mov. From S To Exit: | L2 W | T1 N | R2 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 37 | 353 | - | 390 | 16.9 | 481 | 0.810 | 100 | NA | NA |
| Lane 2 | - | 379 | 28 | 407 | 17.0 | 503 | 0.810 | 100 | NA | NA |
| Approach | 37 | 732 | 28 | 797 | 16.9 | | 0.810 | | | |

East: Aylesbury Street

| Mov. From E To Exit: | L2 S | T1 W | R2 N | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 64 | - | - | 64 | 10.9 | 159 | 0.402 | 100 | 0.0 | 2 |
| Lane 2 | - | 10 | 143 | 153 | 3.3 | 180 | 0.849 | 100 | NA | NA |
| Approach | 64 | 10 | 143 | 217 | 5.5 | | 0.849 | | | |

| North: Ti Rakau Drive (West) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mov. From N To Exit: | L2 E | T1 S | R2 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 52 | 364 | - | 415 | 6.4 | 496 | 0.836 | 100 | NA | NA |
| Lane 2 | - | 364 | 58 | 421 | 5.8 | 503 | 0.836 | 100 | NA | NA |
| Approach | 52 | 727 | 58 | 836 | 6.1 | | 0.836 | | | |

| West: Palm Avenue | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Mov. From W To Exit: | L2 N | T1 E | R2 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 64 | 10 | 21 | 95 | 5.3 | 117 | 0.813 | 100 | NA | NA |
| Approach | 64 | 10 | 21 | 95 | 5.3 | | 0.813 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 1945 | 10.4 | 0.849 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

| Merge Analysis | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
| South Exit: Ti Rakau Drive (East) Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | |
| East Exit: Aylesbury Street Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| North Exit: Ti Rakau Drive (West) Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | |
| West Exit: Palm Avenue Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |

# LANE SUMMARY

## Site: 5.0 [5.0 Pakuranga Highway/ Reeves Rd (Site Folder: AM)]

## Network: N101 [AM (Network Folder: General)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated   Cycle Time = 40 seconds (Site Practical Cycle Time)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SouthEast: Ti Rakau Drive (East)** | | | | | | | | | | | | | | | |
| Lane 1 | 689 | 9.4 | 689 | 9.4 | 865 | 0.795 | 100 | 21.9 | LOS C | 12.3 | 93.1 | Short | 50 | 0.0 | NA |
| Lane 2 | 689 | 9.4 | 689 | 9.4 | 865 | 0.795 | 100 | 17.7 | LOS B | 12.3 | 93.1 | Full | 90 | 0.0 | 18.1[8] |
| Lane 3 | 303 | 12.7 | 303 | 12.7 | 358 | 0.844 | 100 | 23.1 | LOS C | 6.4 | 50.0 | Full | 90 | 0.0 | 0.0 |
| Lane 4 | 303 | 12.7 | 303 | 12.7 | 358 | 0.844 | 100 | 23.1 | LOS C | 6.4 | 50.0 | Full | 90 | 0.0 | 0.0 |
| Approach | 1982 | 10.4 | 1982 | 10.4 | | 0.844 | | 20.8 | LOS C | 12.3 | 93.1 | | | | |
| **NorthWest: Ti Rakau Drive (West)** | | | | | | | | | | | | | | | |
| Lane 1 | 262 | 18.9 | 262 | 18.9 | 351 | 0.745 | 100 | 19.6 | LOS B | 5.0 | 40.7 | Full | 110 | 0.0 | 0.0 |
| Lane 2 | 262 | 18.9 | 262 | 18.9 | 351 | 0.745 | 100 | 19.6 | LOS B | 5.0 | 40.7 | Full | 110 | 0.0 | 0.0 |
| Approach | 524 | 18.9 | 523[N1] | 18.9 | | 0.745 | | 19.6 | LOS B | 5.0 | 40.7 | | | | |
| **SouthWest: Pakuranga HWY** | | | | | | | | | | | | | | | |
| Lane 1 | 75 | 6.7 | 75 | 6.7 | 882 | 0.085 | 100 | 13.1 | LOS B | 0.7 | 5.1 | Short | 72 | 0.0 | NA |
| Lane 2 | 226 | 8.2 | 226 | 8.2 | 262 | 0.861 | 100 | 32.7 | LOS C | 4.9 | 37.0 | Short | 143 | 0.0 | NA |
| Lane 3 | 226 | 8.2 | 226 | 8.2 | 262 | 0.861 | 100 | 32.7 | LOS C | 4.9 | 37.0 | Full | 623 | 0.0 | 0.0 |
| Approach | 526 | 8.0 | 526 | 8.0 | | 0.861 | | 29.9 | LOS C | 4.9 | 37.0 | | | | |
| Intersection | 3032 | 11.5 | 3031[N1] | 11.5 | | 0.861 | | 22.2 | LOS C | 12.3 | 93.1 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

8 Probability of Blockage has been set on the basis of a queue that overflows from a short lane.
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

**Approach Lane Flows (veh/h)**

SouthEast: Ti Rakau Drive (East)

| Mov. From SE To Exit: | L2 SW | T1 NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 689 | - | 689 | 9.4 | 865 | 0.795 | 100 | 73.1 | 2 |
| Lane 2 | 689 | - | 689 | 9.4 | 865 | 0.795 | 100 | NA | NA |
| Lane 3 | - | 303 | 303 | 12.7 | 358 | 0.844 | 100 | NA | NA |
| Lane 4 | - | 303 | 303 | 12.7 | 358 | 0.844 | 100 | NA | NA |
| Approach | 1377 | 605 | 1982 | 10.4 | | 0.844 | | | |

NorthWest: Ti Rakau Drive (West)

| Mov. From NW To Exit: | T1 SE | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|
| Lane 1 | 262 | 262 | 18.9 | 351 | 0.745 | 100 | NA | NA |
| Lane 2 | 262 | 262 | 18.9 | 351 | 0.745 | 100 | NA | NA |

| Mov. From SW To Exit: | L2 NW | R2 SE | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Approach | 523 | 523 | 18.9 | | | 0.745 | | | |
| **SouthWest: Pakuranga HWY** | | | | | | | | | |
| Lane 1 | 75 | - | 75 | 6.7 | 882 | 0.085 | 100 | 0.0 | 2 |
| Lane 2 | - | 226 | 226 | 8.2 | 262 | 0.861 | 100 | 0.0 | 3 |
| Lane 3 | - | 226 | 226 | 8.2 | 262 | 0.861 | 100 | NA | NA |
| Approach | 75 | 451 | 526 | 8.0 | | 0.861 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 3031 | 11.5 | 0.861 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

**Merge Analysis**

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | Opposing Flow Rate pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast Exit: Ti Rakau Drive (East) Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| NorthWest Exit: Ti Rakau Drive (West) Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| SouthWest Exit: Pakuranga HWY Merge Type: **Priority** | | | | | | | | | | | | |
| Exit Short Lane | 1 | 280 | 0.0 | 688 | 721 | 3.00 | 2.00 | 688 | 1052 | 0.654 | 1.4 | 4.2 |
| Merge Lane | 2 | - | 100.0 | Merge Lane is not Opposed | | | | 688 | 1800 | 0.383 | 0.0 | 0.0 |
| SouthWest Exit: Pakuranga HWY Merge Type: **Priority** | | | | | | | | | | | | |
| Exit Short Lane | 3 | 10 | 0.0 | 688 | 721 | 3.00 | 2.00 | 0 | 1052 | 0.000 | 1.4 | 1.4 |
| Merge Lane | 2 | - | 100.0 | Merge Lane is not Opposed | | | | 688 | 1800 | 0.383 | 0.0 | 0.0 |

# LANE SUMMARY

## Site: 5.0 [5.0 Pakuranga Highway/ Reeves Rd (Site Folder: PM)]

## Network: N101 [PM (Network Folder: General)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated    Cycle Time = 80 seconds (Site Practical Cycle Time)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total veh/h | DEMAND FLOWS HV ] % | ARRIVAL FLOWS [ Total veh/h | ARRIVAL FLOWS HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 85% BACK OF QUEUE [ Veh | 85% BACK OF QUEUE Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast: Ti Rakau Drive (East) | | | | | | | | | | | | | | | |
| Lane 1 | 523 | 6.7 | 523 | 6.7 | 1102 | 0.474 | 100 | 14.9 | LOS B | 9.7 | 71.7 | Short | 50 | 0.0 | NA |
| Lane 2 | 523 | 6.7 | 523 | 6.7 | 1102 | 0.474 | 100 | 13.0 | LOS B | 9.7 | 71.7 | Full | 90 | 0.0 | 0.0 |
| Lane 3 | 337 | 16.4 | 337 | 16.4 | 377 | 0.894 | 100 | 45.8 | LOS D | 14.9 | 119.1 | Full | 90 | -28.3[N3] | 40.7 |
| Lane 4 | 321 | 16.4 | 321 | 16.4 | 359 | 0.894 | 100 | 46.4 | LOS D | 14.3 | 114.3 | Full | 90 | -31.7[N3] | 36.9 |
| Approach | 1703 | 10.5 | 1703 | 10.5 | | 0.894 | | 26.4 | LOS C | 14.9 | 119.1 | | | | |
| NorthWest: Ti Rakau Drive (West) | | | | | | | | | | | | | | | |
| Lane 1 | 408 | 7.1 | 405 | 7.1 | 565 | 0.717 | 100 | 28.3 | LOS C | 13.2 | 98.0 | Full | 110 | 0.0 | 4.5 |
| Lane 2 | 408 | 7.1 | 405 | 7.1 | 565 | 0.717 | 100 | 28.3 | LOS C | 13.2 | 98.0 | Full | 110 | 0.0 | 4.5 |
| Approach | 816 | 7.1 | 810[N1] | 7.1 | | 0.717 | | 28.3 | LOS C | 13.2 | 98.0 | | | | |
| SouthWest: Pakuranga HWY | | | | | | | | | | | | | | | |
| Lane 1 | 141 | 19.9 | 141 | 19.9 | 638 | 0.221 | 100 | 17.6 | LOS B | 2.5 | 20.9 | Short | 72 | -28.3[N3] | NA |
| Lane 2 | 364 | 13.1 | 364 | 13.1 | 423 | 0.860 | 100 | 47.9 | LOS D | 14.5 | 113.1 | Short | 143 | 0.0 | NA |
| Lane 3 | 364 | 13.1 | 364 | 13.1 | 423 | 0.860 | 100 | 47.9 | LOS D | 14.5 | 113.1 | Full | 623 | 0.0 | 0.0 |
| Approach | 868 | 14.2 | 868 | 14.2 | | 0.860 | | 43.0 | LOS D | 14.5 | 113.1 | | | | |
| Intersection | 3387 | 10.6 | 3381[N1] | 10.6 | | 0.894 | | 31.1 | LOS C | 14.9 | 119.1 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.
N3 Capacity Adjustment due to downstream lane blockage determined by the program.

**Approach Lane Flows (veh/h)**

SouthEast: Ti Rakau Drive (East)

| Mov. From SE To Exit: | L2 SW | T1 NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 523 | - | 523 | 6.7 | 1102 | 0.474 | 100 | 48.3 | 2 |
| Lane 2 | 523 | - | 523 | 6.7 | 1102 | 0.474 | 100 | NA | NA |
| Lane 3 | - | 337 | 337 | 16.4 | 377 | 0.894 | 100 | NA | NA |
| Lane 4 | - | 321 | 321 | 16.4 | 359 | 0.894 | 100 | NA | NA |
| Approach | 1045 | 658 | 1703 | 10.5 | | 0.894 | | | |

NorthWest: Ti Rakau Drive (West)

| Mov. From NW To Exit: | T1 SE | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|
| Lane 1 | 405 | 405 | 7.1 | 565 | 0.717 | 100 | NA | NA |
| Lane 2 | 405 | 405 | 7.1 | 565 | 0.717 | 100 | NA | NA |

| Mov. From SW To Exit: | L2 NW | R2 SE | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Approach | 810 | 810 | 7.1 | | | 0.717 | | | |
| **SouthWest: Pakuranga HWY** | | | | | | | | | |
| Lane 1 | 141 | - | 141 | 19.9 | 638 | 0.221 | 100 | 0.0 | 2 |
| Lane 2 | - | 364 | 364 | 13.1 | 423 | 0.860 | 100 | 0.0 | 3 |
| Lane 3 | - | 364 | 364 | 13.1 | 423 | 0.860 | 100 | NA | NA |
| Approach | 141 | 727 | 868 | 14.2 | | 0.860 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 3381 | 10.6 | 0.894 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

## Merge Analysis

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | Opposing Flow Rate pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast Exit: Ti Rakau Drive (East)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| NorthWest Exit: Ti Rakau Drive (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| SouthWest Exit: Pakuranga HWY<br>Merge Type: **Priority** | | | | | | | | | | | | |
| Exit Short Lane | 1 | 280 | 0.0 | 523 | 540 | 3.00 | 2.00 | 523 | 1244 | 0.420 | 0.9 | 1.9 |
| Merge Lane | 2 | - | 100.0 | Merge Lane is not Opposed | | | | 523 | 1800 | 0.290 | 0.0 | 0.0 |
| SouthWest Exit: Pakuranga HWY<br>Merge Type: **Priority** | | | | | | | | | | | | |
| Exit Short Lane | 3 | 10 | 0.0 | 523 | 540 | 3.00 | 2.00 | 0 | 1244 | 0.000 | 0.9 | 0.9 |
| Merge Lane | 2 | - | 100.0 | Merge Lane is not Opposed | | | | 523 | 1800 | 0.290 | 0.0 | 0.0 |

# CCG LANE SUMMARY

## Common Control Group: CCG2 [WRR / Mattson]

## Network: N101 [AM (Network Folder: General)]

EQUISAT (Fixed-Time/SCATS) Isolated     Cycle Time = 100 seconds (CCG Practical Cycle Time)

**Lane Use and Performance (CCG)**

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site: 7.0 [7.0 William Roberts Rd / Ti Rakau Dr] | | | | | | | | | | | | | | | |
| SouthEast: Ti Rakau Drive (East) | | | | | | | | | | | | | | | |
| Lane 1 | 564 | 9.9 | 564 | 9.9 | 1003 | 0.563 | 100 | 8.8 | LOS A | 9.5 | 72.4 | Full | 60 | 0.0 | 32.2 |
| Lane 2 | 564 | 9.9 | 564 | 9.9 | 1003 | 0.563 | 100 | 2.1 | LOS A | 3.1 | 23.7 | Full | 60 | 0.0 | 0.0 |
| Lane 3 | 564 | 9.9 | 564 | 9.9 | 1003 | 0.563 | 100 | 2.1 | LOS A | 3.1 | 23.7 | Full | 60 | 0.0 | 0.0 |
| Lane 4 | 37 | 5.4 | 37 | 5.4 | 231 | 0.160 | 100 | 52.4 | LOS D | 1.6 | 12.0 | Short | 20 | 0.0 | NA |
| Lane 5 (B) | 17 | 100.0 | 17 | 100.0 | 657 | 0.026 | 100 | 0.5 | LOS A | 0.0 | 0.2 | Full | 60 | 0.0 | 0.0 |
| Approach | 1746 | 10.7 | 1746 | 10.7 | | 0.563 | | 5.3 | LOS A | 9.5 | 72.4 | | | | |
| NorthEast: William Roberts Road Extension | | | | | | | | | | | | | | | |
| Lane 1 | 67 | 6.0 | 67 | 6.0 | 230 | 0.291 | 100 | 45.8 | LOS D | 2.7 | 20.2 | Short | 80 | 0.0 | NA |
| Lane 2 | 208 | 9.2 | 208 | 9.2 | 243 | 0.858 | 100 | 56.5 | LOS E | 10.2 | 77.4 | Full | 110 | 0.0 | 0.0 |
| Approach | 275 | 8.4 | 275 | 8.4 | | 0.858 | | 53.9 | LOS D | 10.2 | 77.4 | | | | |
| NorthWest: Ti Rakau Drive (West) | | | | | | | | | | | | | | | |
| Lane 1 | 143 | 10.9 | 143 | 10.9 | 345 | 0.414 | 100 | 36.8 | LOS D | 4.4 | 34.0 | Full | 107 | 0.0 | 0.0 |
| Lane 2 | 409 | 12.8 | 408 | 12.8 | 985 | 0.414 | 100 | 14.0 | LOS B | 10.3 | 80.0 | Full | 107 | 0.0 | 0.0 |
| Lane 3 | 409 | 12.8 | 408 | 12.8 | 985 | 0.414 | 100 | 14.0 | LOS B | 10.3 | 80.0 | Full | 107 | 0.0 | 0.0 |
| Lane 4 (B) | 13 | 100.0 | 13 | 100.0 | 657 | 0.020 | 100 | 0.5 | LOS A | 0.0 | 0.1 | Full | 107 | 0.0 | 0.0 |
| Approach | 973 | 13.7 | 972[N1] | 13.7 | | 0.414 | | 17.1 | LOS B | 10.3 | 80.0 | | | | |
| Intersection | 2994 | 11.4 | 2994 | 11.4 | | 0.858 | | 13.6 | LOS B | 10.3 | 80.0 | | | | |
| Site: 7.5 [7.5 Mattson Rd/ Ti Rakau Dr] | | | | | | | | | | | | | | | |
| SouthEast: Ti Rakau Drive (East) | | | | | | | | | | | | | | | |
| Lane 1 | 187 | 9.5 | 187 | 9.5 | 212 | 0.879 | 100 | 65.8 | LOS E | 9.7 | 73.3 | Short | 25 | -36.1[N3] | NA |
| Lane 2 | 640 | 9.9 | 640 | 9.9 | 728[1] | 0.879 | 100 | 30.4 | LOS C | 25.3 | 192.0 | Full | 143 | 0.0 | 42.1 |
| Lane 3 | 881 | 9.9 | 881 | 9.9 | 1003 | 0.879 | 100 | 29.9 | LOS C | 27.5[N4] | 209.0[N4] | Full | 143 | 0.0 | 50.0 |
| Lane 4 (B) | 17 | 100.0 | 17 | 100.0 | 647 | 0.026 | 100 | 0.5 | LOS A | 0.0 | 0.2 | Full | 143 | 0.0 | 0.0 |
| Approach | 1725 | 10.7 | 1725 | 10.7 | | 0.879 | | 33.7 | LOS C | 27.5 | 209.0 | | | | |
| NorthWest: Ti Rakau Drive (West) | | | | | | | | | | | | | | | |
| Lane 1 | 112 | 12.2 | 111 | 12.2 | 988 | 0.113 | 27[6] | 12.3 | LOS B | 2.4 | 18.8 | Full | 60 | 0.0 | 0.0 |
| Lane 2 | 410 | 12.2 | 410 | 12.2 | 988 | 0.414 | 100 | 3.2 | LOS A | 2.9 | 22.4 | Full | 60 | 0.0 | 0.0 |
| Lane 3 | 410 | 12.2 | 410 | 12.2 | 988 | 0.414 | 100 | 1.9 | LOS A | 1.8 | 13.5 | Full | 60 | 0.0 | 0.0 |
| Lane 4 | 36 | 11.1 | 36 | 11.1 | 223 | 0.162 | 100 | 52.5 | LOS D | 1.6 | 12.2 | Short | 25 | 0.0 | NA |
| Lane 5 (B) | 13 | 100.0 | 13 | 100.0 | 647 | 0.020 | 100 | 0.5 | LOS A | 0.0 | 0.1 | Full | 60 | 0.0 | 0.0 |
| Approach | 980 | 13.4 | 980 | 13.4 | | 0.414 | | 5.5 | LOS A | 2.9 | 22.4 | | | | |
| SouthWest: Mattson Road | | | | | | | | | | | | | | | |
| Lane 1 | 48 | 4.2 | 48 | 4.2 | 140 | 0.342 | 100 | 50.1 | LOS D | 2.0 | 14.8 | Full | 282 | -39.8[N3] | 0.0 |
| Lane 2 | 64 | 6.3 | 64 | 6.3 | 248 | 0.258 | 100 | 47.2 | LOS D | 2.6 | 19.0 | Full | 282 | 0.0 | 0.0 |
| Approach | 112 | 5.4 | 112 | 5.4 | | 0.342 | | 48.4 | LOS D | 2.6 | 19.0 | | | | |
| Intersection | 2817 | 11.4 | 2817 | 11.4 | | 0.879 | | 24.5 | LOS C | 27.5 | 209.0 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.

Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
6 Lane under-utilisation due to downstream effects
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.
N3 Capacity Adjustment due to downstream lane blockage determined by the program.
N4 Average back of queue has been restricted to the available queue storage space.

## Approach Lane Flows (CCG) (veh/h)

Site: 7.0 [7.0 William Roberts Rd / Ti Rakau Dr]

SouthEast: Ti Rakau Drive (East)

| Mov. From SE To Exit: | T1 NW | R2 NE | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 564 | - | 564 | 9.9 | 1003 | 0.563 | 100 | NA | NA |
| Lane 2 | 564 | - | 564 | 9.9 | 1003 | 0.563 | 100 | NA | NA |
| Lane 3 | 564 | - | 564 | 9.9 | 1003 | 0.563 | 100 | NA | NA |
| Lane 4 | - | 37 | 37 | 5.4 | 231 | 0.160 | 100 | 0.0 | 3 |
| Lane 5 | 17 | - | 17 | 100.0 | 657 | 0.026 | 100 | NA | NA |
| Approach | 1709 | 37 | 1746 | 10.7 | | 0.563 | | | |

NorthEast: William Roberts Road Extension

| Mov. From NE To Exit: | L2 SE | R2 NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 67 | - | 67 | 6.0 | 230 | 0.291 | 100 | 0.0 | 2 |
| Lane 2 | - | 208 | 208 | 9.2 | 243 | 0.858 | 100 | NA | NA |
| Approach | 67 | 208 | 275 | 8.4 | | 0.858 | | | |

NorthWest: Ti Rakau Drive (West)

| Mov. From NW To Exit: | L2 NE | T1 SE | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 60 | 83 | 143 | 10.9 | 345 | 0.414 | 100 | NA | NA |
| Lane 2 | - | 408 | 408 | 12.8 | 985 | 0.414 | 100 | NA | NA |
| Lane 3 | - | 408 | 408 | 12.8 | 985 | 0.414 | 100 | NA | NA |
| Lane 4 | - | 13 | 13 | 100.0 | 657 | 0.020 | 100 | NA | NA |
| Approach | 60 | 912 | 972 | 13.7 | | 0.414 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 2994 | 11.4 | 0.858 |

Site: 7.5 [7.5 Mattson Rd/ Ti Rakau Dr]

SouthEast: Ti Rakau Drive (East)

| Mov. From SE To Exit: | L2 SW | T1 NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 27 | 160 | 187 | 9.5 | 212 | 0.879 | 100 | 100.0 | 2 |
| Lane 2 | - | 640 | 640 | 9.9 | 728[1] | 0.879 | 100 | NA | NA |
| Lane 3 | - | 881 | 881 | 9.9 | 1003 | 0.879 | 100 | NA | NA |
| Lane 4 | - | 17 | 17 | 100.0 | 647 | 0.026 | 100 | NA | NA |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Approach | 27 | 1698 | 1725 | 10.7 | | 0.879 | | | | |

| NorthWest: Ti Rakau Drive (West) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Mov. From NW To Exit: | T1 SE | R2 SW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 111 | - | 111 | 12.2 | 988 | 0.113 | 27 [6] | NA | NA |
| Lane 2 | 410 | - | 410 | 12.2 | 988 | 0.414 | 100 | NA | NA |
| Lane 3 | 410 | - | 410 | 12.2 | 988 | 0.414 | 100 | NA | NA |
| Lane 4 | - | 36 | 36 | 11.1 | 223 | 0.162 | 100 | 0.0 | 3 |
| Lane 5 | 13 | - | 13 | 100.0 | 647 | 0.020 | 100 | NA | NA |
| Approach | 944 | 36 | 980 | 13.4 | | 0.414 | | | |

| SouthWest: Mattson Road | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Mov. From SW To Exit: | L2 NW | R2 SE | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 48 | - | 48 | 4.2 | 140 | 0.342 | 100 | NA | NA |
| Lane 2 | - | 64 | 64 | 6.3 | 248 | 0.258 | 100 | NA | NA |
| Approach | 48 | 64 | 112 | 5.4 | | 0.342 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 2817 | 11.4 | 0.879 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

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

6 Lane under-utilisation due to downstream effects

| Merge Analysis (CCG) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | Opposing Flow Rate pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
| Site: 7.0 [7.0 William Roberts Rd / Ti Rakau Dr] | | | | | | | | | | | |
| SouthEast Exit: Ti Rakau Drive (East)<br>Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 4 | Merge Analysis not applied. | | | | | | | | | |
| NorthEast Exit: William Roberts Road Extension<br>Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| NorthWest Exit: Ti Rakau Drive (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 4 | Merge Analysis not applied. | | | | | | | | | |
| Site: 7.5 [7.5 Mattson Rd/ Ti Rakau Dr] | | | | | | | | | | | |
| SouthEast Exit: Ti Rakau Drive (East)<br>Merge Type: **Priority** | | | | | | | | | | | |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Exit Short Lane | 1 | 40 | 0.0 | 410 | 435 | 3.00 | 2.00 | 111 | 1355 | 0.082 | 0.7 | 0.9 |
| Merge Lane | 2 | - | 100.0 | Merge Lane is not Opposed | | | | 410 | 1800 | 0.228 | 0.0 | 0.0 |
| NorthWest Exit: Ti Rakau Drive (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 4 | Merge Analysis not applied. | | | | | | | | | | |
| SouthWest Exit: Mattson Road<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |

# CCG LANE SUMMARY

## Common Control Group: CCG2 [WRR / Mattson]

## Network: N101 [PM (Network Folder: General)]

EQUISAT (Fixed-Time/SCATS) Isolated     Cycle Time = 60 seconds (CCG User-Given Phase Times)

**Lane Use and Performance (CCG)**

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Site: 7.0 [7.0 William Roberts Rd / Ti Rakau Dr]** | | | | | | | | | | | | | | | |
| SouthEast: Ti Rakau Drive (East) | | | | | | | | | | | | | | | |
| Lane 1 | 547 | 9.3 | 547 | 9.3 | 854 | 0.641 | 100 | 3.3 | LOS A | 4.3 | 32.5 | Full | 60 | 0.0 | 0.0 |
| Lane 2 | 547 | 9.3 | 547 | 9.3 | 854 | 0.641 | 100 | 2.8 | LOS A | 3.7 | 28.3 | Full | 60 | 0.0 | 0.0 |
| Lane 3 | 547 | 9.3 | 547 | 9.3 | 854 | 0.641 | 100 | 2.6 | LOS A | 3.5 | 26.5 | Full | 60 | 0.0 | 0.0 |
| Lane 4 | 145 | 2.8 | 145 | 2.8 | 332 | 0.437 | 100 | 33.8 | LOS C | 4.0 | 28.3 | Short | 20 | 0.0 | NA |
| Lane 5 (B) | 13 | 100.0 | 13 | 100.0 | 557 | 0.023 | 100 | 1.2 | LOS A | 0.0 | 0.3 | Full | 60 | 0.0 | 0.0 |
| Approach | 1799 | 9.4 | 1799 | 9.4 | | 0.641 | | 5.3 | LOS A | 4.3 | 32.5 | | | | |
| NorthEast: William Roberts Road Extension | | | | | | | | | | | | | | | |
| Lane 1 | 46 | 4.3 | 46 | 4.3 | 597 | 0.077 | 100 | 16.9 | LOS B | 0.8 | 6.1 | Short | 80 | 0.0 | NA |
| Lane 2 | 132 | 10.7 | 132 | 10.7 | 172 | 0.769 | 100 | 35.3 | LOS D | 3.9 | 29.8 | Full | 110 | 0.0 | 0.0 |
| Approach | 178 | 9.0 | 178 | 9.0 | | 0.769 | | 30.5 | LOS C | 3.9 | 29.8 | | | | |
| NorthWest: Ti Rakau Drive (West) | | | | | | | | | | | | | | | |
| Lane 1 | 490 | 11.5 | 488 | 11.6 | 819 | 0.596 | 100 | 14.6 | LOS B | 9.2 | 71.0 | Full | 107 | 0.0 | 0.0 |
| Lane 2 | 516 | 7.7 | 514 | 7.7 | 862 | 0.596 | 100 | 12.9 | LOS B | 10.1 | 75.4 | Full | 107 | 0.0 | 0.0 |
| Lane 3 | 516 | 7.7 | 514 | 7.7 | 862 | 0.596 | 100 | 12.9 | LOS B | 10.1 | 75.4 | Full | 107 | 0.0 | 0.0 |
| Lane 4 (B) | 17 | 100.0 | 17 | 100.0 | 557 | 0.031 | 100 | 1.2 | LOS A | 0.0 | 0.4 | Full | 107 | 0.0 | 0.0 |
| Approach | 1538 | 9.9 | 1532[N][1] | 10.0 | | 0.596 | | 13.3 | LOS B | 10.1 | 75.4 | | | | |
| Intersection | 3515 | 9.6 | 3510[N][1] | 9.7 | | 0.769 | | 10.1 | LOS B | 10.1 | 75.4 | | | | |
| **Site: 7.5 [7.5 Mattson Rd/ Ti Rakau Dr]** | | | | | | | | | | | | | | | |
| SouthEast: Ti Rakau Drive (East) | | | | | | | | | | | | | | | |
| Lane 1 | 690 | 8.6 | 690 | 8.6 | 855 | 0.807 | 100 | 18.8 | LOS B | 17.3 | 129.8 | Short | 25 | 0.0 | NA |
| Lane 2 | 409 | 8.8 | 409 | 8.8 | 507[1] | 0.807 | 100 | 19.0 | LOS B | 9.4 | 70.8 | Full | 143 | 0.0 | 6.2[8] |
| Lane 3 | 691 | 8.8 | 691 | 8.8 | 856 | 0.807 | 100 | 19.1 | LOS B | 17.9 | 134.4 | Full | 143 | 0.0 | 9.4 |
| Lane 4 (B) | 13 | 100.0 | 13 | 100.0 | 549 | 0.024 | 100 | 1.2 | LOS A | 0.0 | 0.3 | Full | 143 | 0.0 | 0.0 |
| Approach | 1802 | 9.4 | 1802 | 9.4 | | 0.807 | | 18.8 | LOS B | 17.9 | 134.4 | | | | |
| NorthWest: Ti Rakau Drive (West) | | | | | | | | | | | | | | | |
| Lane 1 | 151 | 7.8 | 150 | 7.8 | 861 | 0.174 | 27[6] | 5.9 | LOS A | 1.1 | 8.2 | Full | 60 | 0.0 | 0.0 |
| Lane 2 | 553 | 7.8 | 551 | 7.8 | 861 | 0.640 | 100 | 3.6 | LOS A | 4.6 | 34.7 | Full | 60 | 0.0 | 0.0 |
| Lane 3 | 553 | 7.8 | 551 | 7.8 | 861 | 0.640 | 100 | 2.5 | LOS A | 3.5 | 25.9 | Full | 60 | 0.0 | 0.0 |
| Lane 4 | 87 | 4.6 | 87 | 4.6 | 328 | 0.264 | 100 | 32.7 | LOS C | 2.3 | 17.0 | Short | 25 | 0.0 | NA |
| Lane 5 (B) | 17 | 100.0 | 17 | 100.0 | 549 | 0.031 | 100 | 1.2 | LOS A | 0.0 | 0.4 | Full | 60 | 0.0 | 0.0 |
| Approach | 1361 | 8.7 | 1356[N][1] | 8.8 | | 0.640 | | 5.2 | LOS A | 4.6 | 34.7 | | | | |
| SouthWest: Mattson Road | | | | | | | | | | | | | | | |
| Lane 1 | 21 | 4.8 | 21 | 4.8 | 596 | 0.035 | 100 | 19.2 | LOS B | 0.4 | 2.7 | Full | 282 | 0.0 | 0.0 |
| Lane 2 | 50 | 4.0 | 50 | 4.0 | 180 | 0.278 | 100 | 33.6 | LOS C | 1.3 | 9.5 | Full | 282 | 0.0 | 0.0 |
| Approach | 71 | 4.2 | 71 | 4.2 | | 0.278 | | 29.3 | LOS C | 1.3 | 9.5 | | | | |
| Intersection | 3234 | 9.0 | 3229[N][1] | 9.0 | | 0.807 | | 13.3 | LOS B | 17.9 | 134.4 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
6 Lane under-utilisation due to downstream effects
8 Probability of Blockage has been set on the basis of a queue that overflows from a short lane.
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

**Approach Lane Flows (CCG) (veh/h)**

Site: 7.0 [7.0 William Roberts Rd / Ti Rakau Dr]

SouthEast: Ti Rakau Drive (East)

| Mov. From SE To Exit: | T1 NW | R2 NE | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 547 | - | 547 | 9.3 | 854 | 0.641 | 100 | NA | NA |
| Lane 2 | 547 | - | 547 | 9.3 | 854 | 0.641 | 100 | NA | NA |
| Lane 3 | 547 | - | 547 | 9.3 | 854 | 0.641 | 100 | NA | NA |
| Lane 4 | - | 145 | 145 | 2.8 | 332 | 0.437 | 100 | 47.0 | 3 |
| Lane 5 | 13 | - | 13 | 100.0 | 557 | 0.023 | 100 | NA | NA |
| Approach | 1654 | 145 | 1799 | 9.4 | | 0.641 | | | |

NorthEast: William Roberts Road Extension

| Mov. From NE To Exit: | L2 SE | R2 NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 46 | - | 46 | 4.3 | 597 | 0.077 | 100 | 0.0 | 2 |
| Lane 2 | - | 132 | 132 | 10.7 | 172 | 0.769 | 100 | NA | NA |
| Approach | 46 | 132 | 178 | 9.0 | | 0.769 | | | |

NorthWest: Ti Rakau Drive (West)

| Mov. From NW To Exit: | L2 NE | T1 SE | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 222 | 266 | 488 | 11.6 | 819 | 0.596 | 100 | NA | NA |
| Lane 2 | - | 514 | 514 | 7.7 | 862 | 0.596 | 100 | NA | NA |
| Lane 3 | - | 514 | 514 | 7.7 | 862 | 0.596 | 100 | NA | NA |
| Lane 4 | - | 17 | 17 | 100.0 | 557 | 0.031 | 100 | NA | NA |
| Approach | 222 | 1310 | 1532 | 10.0 | | 0.596 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 3510 | 9.7 | 0.769 |

Site: 7.5 [7.5 Mattson Rd/ Ti Rakau Dr]

SouthEast: Ti Rakau Drive (East)

| Mov. From SE To Exit: | L2 SW | T1 NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 35 | 655 | 690 | 8.6 | 855 | 0.807 | 100 | 100.0 | 2 |
| Lane 2 | - | 409 | 409 | 8.8 | 507[1] | 0.807 | 100 | NA | NA |
| Lane 3 | - | 691 | 691 | 8.8 | 856 | 0.807 | 100 | NA | NA |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Lane 4 | - | 13 | 13 | 100.0 | 549 | 0.024 | 100 | NA | NA |
| Approach | 35 | 1767 | 1802 | 9.4 | | 0.807 | | | |
| **NorthWest: Ti Rakau Drive (West)** | | | | | | | | | |
| Mov. From NW To Exit: | T1 SE | R2 SW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 150 | - | 150 | 7.8 | 861 | 0.174 | 27[6] | NA | NA |
| Lane 2 | 551 | - | 551 | 7.8 | 861 | 0.640 | 100 | NA | NA |
| Lane 3 | 551 | - | 551 | 7.8 | 861 | 0.640 | 100 | NA | NA |
| Lane 4 | - | 87 | 87 | 4.6 | 328 | 0.264 | 100 | 0.0 | 3 |
| Lane 5 | 17 | - | 17 | 100.0 | 549 | 0.031 | 100 | NA | NA |
| Approach | 1270 | 87 | 1356 | 8.8 | | 0.640 | | | |
| **SouthWest: Mattson Road** | | | | | | | | | |
| Mov. From SW To Exit: | L2 NW | R2 SE | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 21 | - | 21 | 4.8 | 596 | 0.035 | 100 | NA | NA |
| Lane 2 | - | 50 | 50 | 4.0 | 180 | 0.278 | 100 | NA | NA |
| Approach | 21 | 50 | 71 | 4.2 | | 0.278 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 3229 | 9.0 | 0.807 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

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

6 Lane under-utilisation due to downstream effects

**Merge Analysis (CCG)**

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Site: 7.0 [7.0 William Roberts Rd / Ti Rakau Dr] | | | | | | | | | | | |
| SouthEast Exit: Ti Rakau Drive (East) Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 4 | Merge Analysis not applied. | | | | | | | | | |
| NorthEast Exit: William Roberts Road Extension Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| NorthWest Exit: Ti Rakau Drive (West) Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 4 | Merge Analysis not applied. | | | | | | | | | |
| Site: 7.5 [7.5 Mattson Rd/ Ti Rakau Dr] | | | | | | | | | | | |
| SouthEast Exit: Ti Rakau Drive (East) | | | | | | | | | | | |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Merge Type: **Priority** | | | | | | | | | | | | |
| Exit Short Lane | 1 | 40 | 0.0 | 551 | 573 | 3.00 | 2.00 | 150 | 1210 | 0.124 | 1.0 | 1.3 |
| Merge Lane | 2 | - | 100.0 | Merge Lane is not Opposed | | | | 551 | 1800 | 0.306 | 0.0 | 0.0 |
| NorthWest Exit: Ti Rakau Drive (West) | | | | | | | | | | | | |
| Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 4 | Merge Analysis not applied. | | | | | | | | | | |
| SouthWest Exit: Mattson Road | | | | | | | | | | | | |
| Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |

# LANE SUMMARY

**Site: 8.1 [8.1 U-turn - West of Marriot Rd (Site Folder: AM)]**

**Network: N101 [AM (Network Folder: General)]**

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated  Cycle Time = 30 seconds (Site Practical Cycle Time)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast: Ti Rakau Drive (East) | | | | | | | | | | | | | | | |
| Lane 1 | 849 | 10.0 | 849 | 10.0 | 1822 | 0.466 | 100 | 0.1 | LOS A | 0.0 | 0.0 | Full | 147 | 0.0 | 0.0 |
| Lane 2 | 849 | 10.0 | 849 | 10.0 | 1822 | 0.466 | 100 | 0.1 | LOS A | 0.0 | 0.0 | Full | 147 | 0.0 | 0.0 |
| Lane 3 | 84 | 6.0 | 84 | 6.0 | 267 | 0.315 | 100 | 18.4 | LOS B | 1.1 | 7.7 | Short | 14 | 0.0 | NA |
| Lane 4 (B) | 17 | 100.0 | 17 | 100.0 | 478 | 0.036 | 100 | 2.1 | LOS A | 0.0 | 0.6 | Full | 147 | 0.0 | 0.0 |
| Approach | 1799 | 10.6 | 1799 | 10.6 | | 0.466 | | 0.9 | LOS A | 1.1 | 7.7 | | | | |
| NorthWest: Ti Rakau Drive (West) | | | | | | | | | | | | | | | |
| Lane 1 | 500 | 11.9 | 500 | 11.9 | 720 | 0.694 | 100 | 9.7 | LOS A | 6.2 | 48.0 | Full | 73 | 0.0 | 0.0 |
| Lane 2 | 500 | 11.9 | 500 | 11.9 | 720 | 0.694 | 100 | 9.7 | LOS A | 6.2 | 48.0 | Full | 73 | 0.0 | 0.0 |
| Lane 3 (B) | 13 | 100.0 | 13 | 100.0 | 478 | 0.027 | 100 | 2.1 | LOS A | 0.0 | 0.5 | Full | 73 | 0.0 | 0.0 |
| Approach | 1013 | 13.0 | 1013 | 13.0 | | 0.694 | | 9.6 | LOS A | 6.2 | 48.0 | | | | |
| Intersection | 2812 | 11.5 | 2812 | 11.5 | | 0.694 | | 4.1 | LOS A | 6.2 | 48.0 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

**Approach Lane Flows (veh/h)**

SouthEast: Ti Rakau Drive (East)

| Mov. From SE To Exit: | T1 NW | U SE | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 849 | - | 849 | 10.0 | 1822 | 0.466 | 100 | NA | NA |
| Lane 2 | 849 | - | 849 | 10.0 | 1822 | 0.466 | 100 | NA | NA |
| Lane 3 | - | 84 | 84 | 6.0 | 267 | 0.315 | 100 | 0.0 | 2 |
| Lane 4 | 17 | - | 17 | 100.0 | 478 | 0.036 | 100 | NA | NA |
| Approach | 1715 | 84 | 1799 | 10.6 | | 0.466 | | | |

NorthWest: Ti Rakau Drive (West)

| Mov. From NW To Exit: | T1 SE | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|
| Lane 1 | 500 | 500 | 11.9 | 720 | 0.694 | 100 | NA | NA |
| Lane 2 | 500 | 500 | 11.9 | 720 | 0.694 | 100 | NA | NA |
| Lane 3 | 13 | 13 | 100.0 | 478 | 0.027 | 100 | NA | NA |
| Approach | 1013 | 1013 | 13.0 | | 0.694 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 2812 | 11.5 | 0.694 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

| Merge Analysis | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast Exit: Ti Rakau Drive (East)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | | |
| NorthWest Exit: Ti Rakau Drive (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | | |

# LANE SUMMARY

**Site: 8.1 [8.1 U-turn - West of Marriot Rd (Site Folder: PM)]**

**Network: N101 [PM (Network Folder: General)]**

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated    Cycle Time = 40 seconds (Site Practical Cycle Time)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total | HV ] | ARRIVAL FLOWS [ Total | HV ] | Cap. | Deg. Satn | Lane Util. | Aver. Delay | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] | Lane Config | Lane Length | Cap. Adj. | Prob. Block. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | veh/h | % | veh/h | % | veh/h | v/c | % | sec | | | m | | m | % | % |
| SouthEast: Ti Rakau Drive (East) | | | | | | | | | | | | | | | |
| Lane 1 | 903 | 8.7 | 903 | 8.7 | 1836 | 0.492 | 100 | 0.1 | LOS A | 0.0 | 0.0 | Full | 147 | 0.0 | 0.0 |
| Lane 2 | 904 | 8.7 | 903 | 8.7 | 1836 | 0.492 | 100 | 0.1 | LOS A | 0.0 | 0.0 | Full | 147 | 0.0 | 0.0 |
| Lane 3 | 137 | 5.1 | 137 | 5.1 | 235 | 0.584 | 100 | 24.6 | LOS C | 2.5 | 18.2 | Short | 14 | 0.0 | NA |
| Lane 4 (B) | 13 | 100.0 | 13 | 100.0 | 627 | 0.021 | 100 | 0.2 | LOS A | 0.0 | 0.1 | Full | 147 | 0.0 | 0.0 |
| Approach | 1957 | 9.0 | 1957 | 9.0 | | 0.584 | | 1.8 | LOS A | 2.5 | 18.2 | | | | |
| NorthWest: Ti Rakau Drive (West) | | | | | | | | | | | | | | | |
| Lane 1 | 652 | 7.7 | 650 | 7.7 | 970 | 0.670 | 100 | 8.1 | LOS A | 8.8 | 65.5 | Full | 73 | 0.0 | 5.1 |
| Lane 2 | 652 | 7.7 | 650 | 7.7 | 970 | 0.670 | 100 | 8.1 | LOS A | 8.8 | 65.5 | Full | 73 | 0.0 | 5.1 |
| Lane 3 (B) | 17 | 100.0 | 17 | 100.0 | 627 | 0.027 | 100 | 0.2 | LOS A | 0.0 | 0.1 | Full | 73 | 0.0 | 0.0 |
| Approach | 1321 | 8.9 | 1317 N1 | 8.9 | | 0.670 | | 8.0 | LOS A | 8.8 | 65.5 | | | | |
| Intersection | 3278 | 9.0 | 3274 N1 | 9.0 | | 0.670 | | 4.3 | LOS A | 8.8 | 65.5 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

**Approach Lane Flows (veh/h)**

SouthEast: Ti Rakau Drive (East)

| Mov. From SE To Exit: | T1 NW | U SE | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 903 | - | 903 | 8.7 | 1836 | 0.492 | 100 | NA | NA |
| Lane 2 | 903 | - | 903 | 8.7 | 1836 | 0.492 | 100 | NA | NA |
| Lane 3 | - | 137 | 137 | 5.1 | 235 | 0.584 | 100 | 39.2 | 2 |
| Lane 4 | 13 | - | 13 | 100.0 | 627 | 0.021 | 100 | NA | NA |
| Approach | 1820 | 137 | 1957 | 9.0 | | 0.584 | | | |

NorthWest: Ti Rakau Drive (West)

| Mov. From NW To Exit: | T1 SE | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|
| Lane 1 | 650 | 650 | 7.7 | 970 | 0.670 | 100 | NA | NA |
| Lane 2 | 650 | 650 | 7.7 | 970 | 0.670 | 100 | NA | NA |
| Lane 3 | 17 | 17 | 100.0 | 627 | 0.027 | 100 | NA | NA |
| Approach | 1317 | 1317 | 8.9 | | 0.670 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 3274 | 9.0 | 0.670 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

| Merge Analysis | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast Exit: Ti Rakau Drive (East)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | | |
| NorthWest Exit: Ti Rakau Drive (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | | |

# LANE SUMMARY

## Site: 10.1 [10.1 U-turn - East of Edgewater Dr (West) (Site Folder: AM)]

## Network: N101 [AM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 40 seconds (Site Practical Cycle Time)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SouthEast: Ti Rakau Drive (East)** | | | | | | | | | | | | | | | |
| Lane 1 | 799 | 9.6 | 799 | 9.6 | 959 | 0.833 | 100 | 14.8 | LOS B | 12.3 N4 | 93.5 N4 | Full | 64 | 0.0 | 50.0 |
| Lane 2 | 799 | 9.6 | 799 | 9.6 | 959 | 0.833 | 100 | 14.8 | LOS B | 12.3 N4 | 93.5 N4 | Full | 64 | 0.0 | 50.0 |
| Lane 3 (B) | 17 | 100.0 | 17 | 100.0 | 627 | 0.027 | 100 | 0.2 | LOS A | 0.0 | 0.1 | Full | 64 | 0.0 | 0.0 |
| Approach | 1615 | 10.5 | 1615 | 10.5 | | 0.833 | | 14.7 | LOS B | 12.3 | 93.5 | | | | |
| **NorthWest: Ti Rakau Drive (West)** | | | | | | | | | | | | | | | |
| Lane 1 | 555 | 11.5 | 555 | 11.5 | 1805 | 0.308 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 81 | 0.0 | 0.0 |
| Lane 2 | 555 | 11.5 | 555 | 11.5 | 1805 | 0.308 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 81 | 0.0 | 0.0 |
| Lane 3 | 179 | 12.3 | 179 | 12.3 | 225 | 0.797 | 100 | 28.9 | LOS C | 3.8 | 29.1 | Short | 15 | 0.0 | NA |
| Lane 4 (B) | 13 | 100.0 | 13 | 100.0 | 627 | 0.021 | 100 | 0.2 | LOS A | 0.0 | 0.1 | Full | 81 | 0.0 | 0.0 |
| Approach | 1302 | 12.5 | 1302 | 12.5 | | 0.797 | | 4.0 | LOS A | 3.8 | 29.1 | | | | |
| Intersection | 2917 | 11.4 | 2917 | 11.4 | | 0.833 | | 9.9 | LOS A | 12.3 | 93.5 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N4 Average back of queue has been restricted to the available queue storage space.

**Approach Lane Flows (veh/h)**

SouthEast: Ti Rakau Drive (East)

| Mov. From SE To Exit: | T1 NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|
| Lane 1 | 799 | 799 | 9.6 | 959 | 0.833 | 100 | NA | NA |
| Lane 2 | 799 | 799 | 9.6 | 959 | 0.833 | 100 | NA | NA |
| Lane 3 | 17 | 17 | 100.0 | 627 | 0.027 | 100 | NA | NA |
| Approach | 1615 | 1615 | 10.5 | | 0.833 | | | |

NorthWest: Ti Rakau Drive (West)

| Mov. From NW To Exit: | T1 SE | U NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 555 | - | 555 | 11.5 | 1805 | 0.308 | 100 | NA | NA |
| Lane 2 | 555 | - | 555 | 11.5 | 1805 | 0.308 | 100 | NA | NA |
| Lane 3 | - | 179 | 179 | 12.3 | 225 | 0.797 | 100 | 76.9 | 2 |
| Lane 4 | 13 | - | 13 | 100.0 | 627 | 0.021 | 100 | NA | NA |
| Approach | 1123 | 179 | 1302 | 12.5 | | 0.797 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 2917 | 11.4 | 0.833 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

**Merge Analysis**

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast Exit: Ti Rakau Drive (East)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | | |
| NorthWest Exit: Ti Rakau Drive (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | | |

# LANE SUMMARY

## Site: 10.1 [10.1 U-turn - East of Edgewater Dr (West) (Site Folder: PM)]

## Network: N101 [PM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated    Cycle Time = 50 seconds (Site Practical Cycle Time)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast: Ti Rakau Drive (East) | | | | | | | | | | | | | | | |
| Lane 1 | 925 | 8.4 | 925 | 8.4 | 1141 | 0.811 | 100 | 12.1 | LOS B | 12.5 N4 | 93.5 N4 | Full | 64 | 0.0 | 50.0 |
| Lane 2 | 925 | 8.4 | 925 | 8.4 | 1141 | 0.811 | 100 | 12.1 | LOS B | 12.5 N4 | 93.5 N4 | Full | 64 | 0.0 | 50.0 |
| Lane 3 (B) | 13 | 100.0 | 13 | 100.0 | 740 | 0.018 | 100 | 0.2 | LOS A | 0.0 | 0.1 | Full | 64 | 0.0 | 0.0 |
| Approach | 1863 | 9.0 | 1863 | 9.0 | | 0.811 | | 12.0 | LOS B | 12.5 | 93.5 | | | | |
| NorthWest: Ti Rakau Drive (West) | | | | | | | | | | | | | | | |
| Lane 1 | 566 | 5.5 | 566 | 5.5 | 1873 | 0.302 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 81 | 0.0 | 0.0 |
| Lane 2 | 566 | 5.5 | 566 | 5.5 | 1873 | 0.302 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 81 | 0.0 | 0.0 |
| Lane 3 | 145 | 7.6 | 145 | 7.6 | 185 | 0.784 | 100 | 34.2 | LOS C | 3.7 | 27.5 | Short | 15 | 0.0 | NA |
| Lane 4 (B) | 17 | 100.0 | 17 | 100.0 | 740 | 0.023 | 100 | 0.2 | LOS A | 0.0 | 0.1 | Full | 81 | 0.0 | 0.0 |
| Approach | 1294 | 7.0 | 1294 | 7.0 | | 0.784 | | 3.9 | LOS A | 3.7 | 27.5 | | | | |
| Intersection | 3157 | 8.2 | 3157 | 8.2 | | 0.811 | | 8.7 | LOS A | 12.5 | 93.5 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N4 Average back of queue has been restricted to the available queue storage space.

**Approach Lane Flows (veh/h)**

SouthEast: Ti Rakau Drive (East)

| Mov. From SE To Exit: | T1 NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|
| Lane 1 | 925 | 925 | 8.4 | 1141 | 0.811 | 100 | NA | NA |
| Lane 2 | 925 | 925 | 8.4 | 1141 | 0.811 | 100 | NA | NA |
| Lane 3 | 13 | 13 | 100.0 | 740 | 0.018 | 100 | NA | NA |
| Approach | 1863 | 1863 | 9.0 | | 0.811 | | | |

NorthWest: Ti Rakau Drive (West)

| Mov. From NW To Exit: | T1 SE | U NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 566 | - | 566 | 5.5 | 1873 | 0.302 | 100 | NA | NA |
| Lane 2 | 566 | - | 566 | 5.5 | 1873 | 0.302 | 100 | NA | NA |
| Lane 3 | - | 145 | 145 | 7.6 | 185 | 0.784 | 100 | 71.8 | 2 |
| Lane 4 | 17 | - | 17 | 100.0 | 740 | 0.023 | 100 | NA | NA |
| Approach | 1149 | 145 | 1294 | 7.0 | | 0.784 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 3157 | 8.2 | 0.811 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

| Merge Analysis | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Exit Lane Number | Short Lane Length | Percent Opng in Lane | Opposing Flow Rate | | Critical Gap | Follow-up Headway | Lane Flow Rate | Capacity | Deg. Satn | Min. Delay | Merge Delay |
| | | m | % | veh/h | pcu/h | sec | sec | veh/h | veh/h | v/c | sec | sec |
| SouthEast Exit: Ti Rakau Drive (East)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | | |
| NorthWest Exit: Ti Rakau Drive (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | | |

# LANE SUMMARY

## Site: 13.0 [13.0 Gossamer Dr / Ti Rakau Dr (Site Folder: AM)]

## Network: N101 [AM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated    Cycle Time = 140 seconds (Site User-Given Phase Times)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Fremantle Place | | | | | | | | | | | | | | | |
| Lane 1 | 20 | 10.0 | 20 | 10.0 | 137 | 0.146 | 100 | 71.4 | LOS E | 1.2 | 8.9 | Short | 9 | 0.0 | NA |
| Lane 2 | 28 | 7.1 | 28 | 7.1 | 142 | 0.197 | 100 | 69.9 | LOS E | 1.7 | 12.3 | Full | 285 | 0.0 | 0.0 |
| Approach | 48 | 8.3 | 48 | 8.3 | | 0.197 | | 70.6 | LOS E | 1.7 | 12.3 | | | | |
| East: Ti Rakau Drive (East) | | | | | | | | | | | | | | | |
| Lane 1 | 775 | 10.3 | 775 | 10.3 | 844 | 0.919 | 100 | 57.7 | LOS E | 52.2 | 397.9 | Full | 636 | 0.0 | 0.0 |
| Lane 2 | 756 | 10.5 | 756 | 10.5 | 823 [1] | 0.919 | 100 | 53.1 | LOS D | 50.4 | 384.1 | Full | 636 | 0.0 | 0.0 |
| Lane 3 (B) | 17 | 100.0 | 17 | 100.0 | 672 | 0.025 | 100 | 0.6 | LOS A | 0.0 | 0.3 | Short | 60 | 0.0 | NA |
| Lane 4 | 201 | 9.2 | 201 | 9.2 | 310 | 0.649 | 82 [6] | 36.8 | LOS D | 7.5 | 56.7 | Short | 150 | 0.0 | NA |
| Lane 5 | 245 | 9.2 | 245 | 9.2 | 310 | 0.792 | 100 | 45.7 | LOS D | 9.9 | 75.0 | Short | 103 | 0.0 | NA |
| Approach | 1994 | 10.9 | 1994 | 10.9 | | 0.919 | | 51.9 | LOS D | 52.2 | 397.9 | | | | |
| North: Gossamer Drive | | | | | | | | | | | | | | | |
| Lane 1 | 412 | 7.3 | 412 | 7.3 | 447 | 0.922 | 100 | 78.6 | LOS E | 29.6 | 220.1 | Short | 150 | 0.0 | NA |
| Lane 2 | 341 | 7.3 | 341 | 7.3 | 370 [1] | 0.922 | 100 | 78.4 | LOS E | 23.8 | 177.3 | Full | 1010 | 0.0 | 0.0 |
| Lane 3 | 101 | 8.9 | 101 | 8.9 | 199 | 0.506 | 100 | 68.7 | LOS E | 6.0 | 45.0 | Short | 28 | 0.0 | NA |
| Approach | 854 | 7.5 | 854 | 7.5 | | 0.922 | | 77.4 | LOS E | 29.6 | 220.1 | | | | |
| West: Ti Rakau Drive (West) | | | | | | | | | | | | | | | |
| Lane 1 | 100 | 8.0 | 100 | 8.0 | 549 | 0.182 | 100 | 41.9 | LOS D | 4.4 | 32.9 | Short | 28 | 0.0 | NA |
| Lane 2 | 449 | 11.9 | 449 | 11.9 | 480 [1] | 0.936 | 100 | 72.8 | LOS E | 32.0 | 246.4 | Full | 479 | 0.0 | 0.0 |
| Lane 3 | 470 | 11.9 | 470 | 11.9 | 502 [1] | 0.936 | 100 | 72.7 | LOS E | 33.7 | 260.0 | Full | 479 | 0.0 | 0.0 |
| Lane 4 | 53 | 11.3 | 53 | 11.3 | 97 | 0.547 | 100 | 78.1 | LOS E | 3.4 | 25.7 | Short | 23 | 0.0 | NA |
| Lane 5 (B) | 13 | 100.0 | 13 | 100.0 | 94 | 0.139 | 100 | 62.3 | LOS E | 0.7 | 9.4 | Full | 479 | 0.0 | 0.0 |
| Approach | 1085 | 12.5 | 1085 | 12.5 | | 0.936 | | 70.0 | LOS E | 33.7 | 260.0 | | | | |
| Intersection | 3981 | 10.6 | 3981 | 10.6 | | 0.936 | | 62.5 | LOS E | 52.2 | 397.9 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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

**Approach Lane Flows (veh/h)**

South: Fremantle Place

| Mov. From S To Exit: | L2 W | T1 N | R2 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 20 | - | - | 20 | 10.0 | 137 | 0.146 | 100 | 14.4 | 2 |
| Lane 2 | - | 11 | 17 | 28 | 7.1 | 142 | 0.197 | 100 | NA | NA |

| Mov. | L2 | T1 | R2 | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Approach | 20 | 11 | 17 | 48 | 8.3 | | 0.197 | | | |

East: Ti Rakau Drive (East)

| Mov. From E To Exit: | L2 S | T1 W | R2 N | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 20 | 755 | - | 775 | 10.3 | 844 | 0.919 | 100 | NA | NA |
| Lane 2 | - | 756 | - | 756 | 10.5 | 823[1] | 0.919 | 100 | NA | NA |
| Lane 3 | - | 17 | - | 17 | 100.0 | 672 | 0.025 | 100 | 0.0 | 2 |
| Lane 4 | - | - | 201 | 201 | 9.2 | 310 | 0.649 | 82[6] | 0.0 | 2 |
| Lane 5 | - | - | 245 | 245 | 9.2 | 310 | 0.792 | 100 | 0.0 | 4 |
| Approach | 20 | 1528 | 446 | 1994 | 10.9 | | 0.919 | | | |

North: Gossamer Drive

| Mov. From N To Exit: | L2 E | T1 S | R2 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 412 | - | - | 412 | 7.3 | 447 | 0.922 | 100 | 50.4 | 2 |
| Lane 2 | 341 | - | - | 341 | 7.3 | 370[1] | 0.922 | 100 | NA | NA |
| Lane 3 | - | 10 | 91 | 101 | 8.9 | 199 | 0.506 | 100 | 59.1 | 2 |
| Approach | 753 | 10 | 91 | 854 | 7.5 | | 0.922 | | | |

West: Ti Rakau Drive (West)

| Mov. From W To Exit: | L2 N | T1 E | R2 S | U W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 100 | - | - | - | 100 | 8.0 | 549 | 0.182 | 100 | 29.8 | 2 |
| Lane 2 | - | 449 | - | - | 449 | 11.9 | 480[1] | 0.936 | 100 | NA | NA |
| Lane 3 | - | 470 | - | - | 470 | 11.9 | 502[1] | 0.936 | 100 | NA | NA |
| Lane 4 | - | - | 10 | 43 | 53 | 11.3 | 97 | 0.547 | 100 | 25.2 | 3 |
| Lane 5 | - | 13 | - | - | 13 | 100.0 | 94 | 0.139 | 100 | NA | NA |
| Approach | 100 | 932 | 10 | 43 | 1085 | 12.5 | | 0.936 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 3981 | 10.6 | 0.936 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

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

6 Lane under-utilisation due to downstream effects

**Merge Analysis**

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | Opposing Flow Rate pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South Exit: Fremantle Place<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| East Exit: Ti Rakau Drive (East)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| North Exit: Gossamer Drive<br>Merge Type: **Zipper** | | | | | | | | | | | | |
| Exit Short Lane | 1 | 150 | 50.0 | 123 | 128 | 2.50 | 2.00 | 312 | 1653 | 0.189 | 0.0 | 0.1 |
| Merge Lane | 2 | - | 50.0 | 156 | 163 | 2.50 | 2.00 | 245 | 1611 | 0.152 | 0.0 | 0.1 |
| West Exit: Ti Rakau Drive (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |

| | | |
|---|---|---|
| Full Length Lane | 1 | Merge Analysis not applied. |
| Full Length Lane | 2 | Merge Analysis not applied. |
| Full Length Lane | 3 | Merge Analysis not applied. |

# LANE SUMMARY

## Site: 13.0 [13.0 Gossamer Dr / Ti Rakau Dr (Site Folder: PM)]

## Network: N101 [PM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 150 seconds (Site User-Given Phase Times)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Fremantle Place | | | | | | | | | | | | | | | |
| Lane 1 | 11 | 0.0 | 11 | 0.0 | 175 | 0.063 | 100 | 72.1 | LOS E | 0.7 | 4.7 | Short | 9 | 0.0 | NA |
| Lane 2 | 27 | 3.7 | 27 | 3.7 | 173 | 0.156 | 100 | 71.6 | LOS E | 1.7 | 12.0 | Full | 285 | 0.0 | 0.0 |
| Approach | 38 | 2.6 | 38 | 2.6 | | 0.156 | | 71.7 | LOS E | 1.7 | 12.0 | | | | |
| East: Ti Rakau Drive (East) | | | | | | | | | | | | | | | |
| Lane 1 | 905 | 8.3 | 905 | 8.3 | 932 | 0.971 | 100 | 76.3 | LOS E | 74.8 | 561.1 | Full | 636 | 0.0 | 3.7 |
| Lane 2 | 888 | 8.5 | 888 | 8.5 | 915[1] | 0.971 | 100 | 71.9 | LOS E | 72.7 | 545.9 | Full | 636 | 0.0 | 1.2 |
| Lane 3 (B) | 13 | 100.0 | 13 | 100.0 | 721 | 0.018 | 100 | 0.6 | LOS A | 0.0 | 0.2 | Short | 60 | 0.0 | NA |
| Lane 4 | 302 | 2.8 | 302 | 2.8 | 362 | 0.835 | 82[6] | 56.8 | LOS E | 13.7 | 98.2 | Short | 150 | 0.0 | NA |
| Lane 5 | 369 | 2.8 | 369 | 2.8 | 362 | 1.018 | 100 | 93.4 | LOS F | 25.3 | 181.4 | Short | 103 | 0.0 | NA |
| Approach | 2477 | 7.4 | 2477 | 7.4 | | 1.018 | | 74.5 | LOS E | 74.8 | 561.1 | | | | |
| North: Gossamer Drive | | | | | | | | | | | | | | | |
| Lane 1 | 206 | 15.1 | 206 | 15.1 | 407 | 0.507 | 100 | 57.2 | LOS E | 11.7 | 92.3 | Short | 150 | 0.0 | NA |
| Lane 2 | 166 | 15.1 | 166 | 15.1 | 327[1] | 0.507 | 100 | 55.6 | LOS E | 9.1 | 71.7 | Full | 1010 | 0.0 | 0.0 |
| Lane 3 | 96 | 4.2 | 96 | 4.2 | 156 | 0.614 | 100 | 78.1 | LOS E | 6.3 | 45.8 | Short | 28 | 0.0 | NA |
| Approach | 468 | 12.8 | 468 | 12.8 | | 0.614 | | 60.9 | LOS E | 11.7 | 92.3 | | | | |
| West: Ti Rakau Drive (West) | | | | | | | | | | | | | | | |
| Lane 1 | 47 | 2.1 | 47 | 2.1 | 607 | 0.077 | 100 | 40.8 | LOS D | 2.1 | 14.7 | Short | 28 | 0.0 | NA |
| Lane 2 | 548 | 5.6 | 548 | 5.6 | 582[1] | 0.943 | 100 | 75.9 | LOS E | 42.2 | 309.4 | Full | 479 | 0.0 | 0.0 |
| Lane 3 | 515 | 5.6 | 515 | 5.6 | 546[1] | 0.943 | 100 | 75.9 | LOS E | 39.1 | 286.8 | Full | 479 | 0.0 | 0.0 |
| Lane 4 | 67 | 3.0 | 67 | 3.0 | 98 | 0.687 | 100 | 85.4 | LOS F | 4.6 | 33.3 | Short | 23 | 0.0 | NA |
| Lane 5 (B) | 17 | 100.0 | 17 | 100.0 | 96 | 0.178 | 100 | 66.5 | LOS E | 1.0 | 13.2 | Full | 479 | 0.0 | 0.0 |
| Approach | 1194 | 6.6 | 1194 | 6.6 | | 0.943 | | 74.9 | LOS E | 42.2 | 309.4 | | | | |
| Intersection | 4177 | 7.7 | 4177 | 7.7 | | 1.018 | | 73.1 | LOS E | 74.8 | 561.1 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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

**Approach Lane Flows (veh/h)**

South: Fremantle Place

| Mov. From S To Exit: | L2 W | T1 N | R2 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 11 | - | - | 11 | 0.0 | 175 | 0.063 | 100 | 0.0 | 2 |
| Lane 2 | - | 10 | 17 | 27 | 3.7 | 173 | 0.156 | 100 | NA | NA |

| | L2 | T1 | R2 | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Approach | 11 | 10 | 17 | 38 | 2.6 | | 0.156 | | | |

East: Ti Rakau Drive (East)

| Mov. From E To Exit: | L2 S | T1 W | R2 N | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 21 | 884 | - | 905 | 8.3 | 932 | 0.971 | 100 | NA | NA |
| Lane 2 | - | 888 | - | 888 | 8.5 | 915[1] | 0.971 | 100 | NA | NA |
| Lane 3 | - | 13 | - | 13 | 100.0 | 721 | 0.018 | 100 | 0.0 | 2 |
| Lane 4 | - | - | 302 | 302 | 2.8 | 362 | 0.835 | 82[6] | 32.4 | 2 |
| Lane 5 | - | - | 369 | 369 | 2.8 | 362 | 1.018 | 100 | 67.7 | 4 |
| Approach | 21 | 1785 | 671 | 2477 | 7.4 | | 1.018 | | | |

North: Gossamer Drive

| Mov. From N To Exit: | L2 E | T1 S | R2 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 206 | - | - | 206 | 15.1 | 407 | 0.507 | 100 | 0.0 | 2 |
| Lane 2 | 166 | - | - | 166 | 15.1 | 327[1] | 0.507 | 100 | NA | NA |
| Lane 3 | - | 10 | 86 | 96 | 4.2 | 156 | 0.614 | 100 | 60.7 | 2 |
| Approach | 372 | 10 | 86 | 468 | 12.8 | | 0.614 | | | |

West: Ti Rakau Drive (West)

| Mov. From W To Exit: | L2 N | T1 E | R2 S | U W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 47 | - | - | - | 47 | 2.1 | 607 | 0.077 | 100 | 0.0 | 2 |
| Lane 2 | - | 548 | - | - | 548 | 5.6 | 582[1] | 0.943 | 100 | NA | NA |
| Lane 3 | - | 515 | - | - | 515 | 5.6 | 546[1] | 0.943 | 100 | NA | NA |
| Lane 4 | - | - | 19 | 48 | 67 | 3.0 | 98 | 0.687 | 100 | 49.1 | 3 |
| Lane 5 | - | 17 | - | - | 17 | 100.0 | 96 | 0.178 | 100 | NA | NA |
| Approach | 47 | 1080 | 19 | 48 | 1194 | 6.6 | | 0.943 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 4177 | 7.7 | 1.018 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

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

6 Lane under-utilisation due to downstream effects

**Merge Analysis**

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South Exit: Fremantle Place<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| East Exit: Ti Rakau Drive (East)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| North Exit: Gossamer Drive<br>Merge Type: **Zipper** | | | | | | | | | | | | |
| Exit Short Lane | 1 | 150 | 50.0 | 181 | 184 | 2.50 | 2.00 | 359 | 1584 | 0.227 | 0.0 | 0.1 |
| Merge Lane | 2 | - | 50.0 | 180 | 182 | 2.50 | 2.00 | 362 | 1586 | 0.228 | 0.0 | 0.1 |
| West Exit: Ti Rakau Drive (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |

| | | |
|---|---|---|
| Full Length Lane | 1 | Merge Analysis not applied. |
| Full Length Lane | 2 | Merge Analysis not applied. |
| Full Length Lane | 3 | Merge Analysis not applied. |

# Appendix H

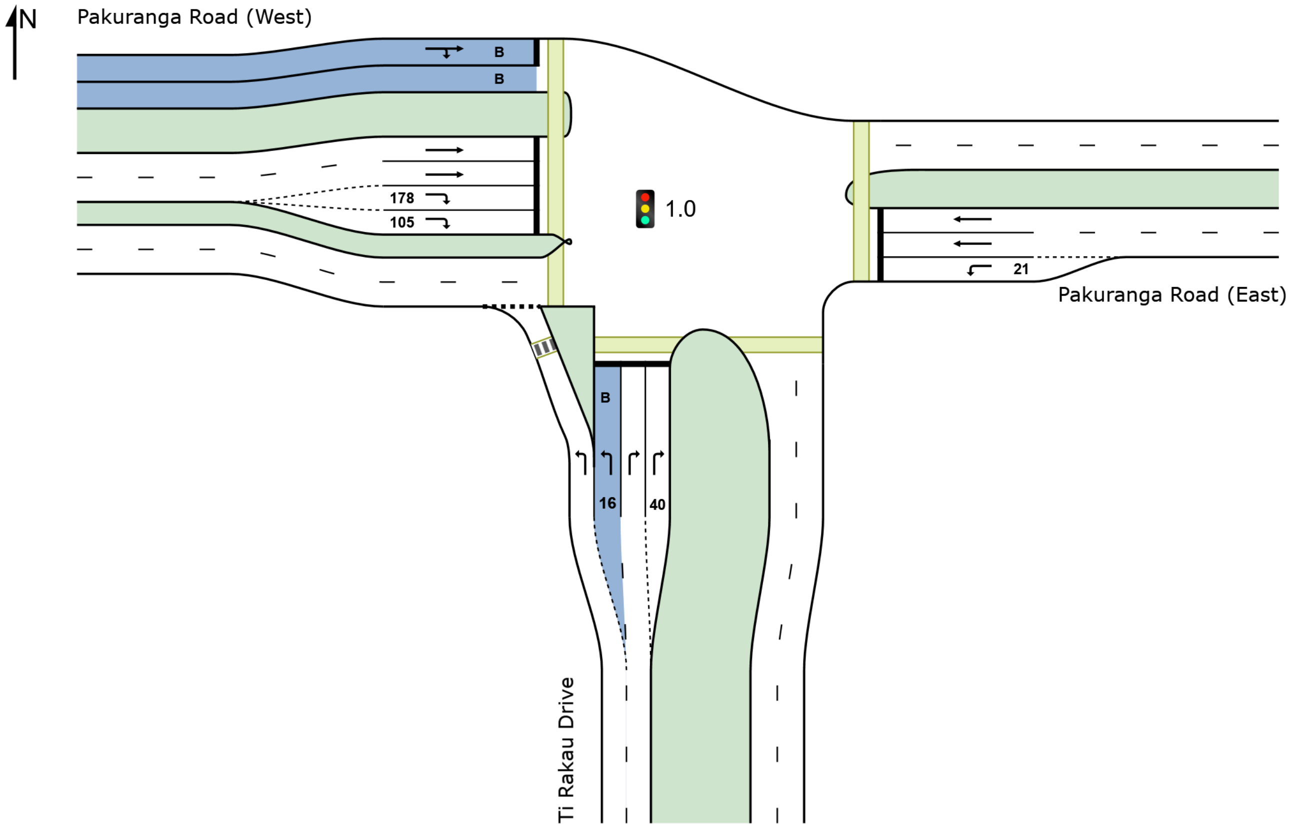
**Construction Scenario 3 – Phasing Diagrams**

# SITE LAYOUT

## Site: 1.0 [1.0 Pakuranga Rd / Ti Rakau Dr (Site Folder: AM)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated

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

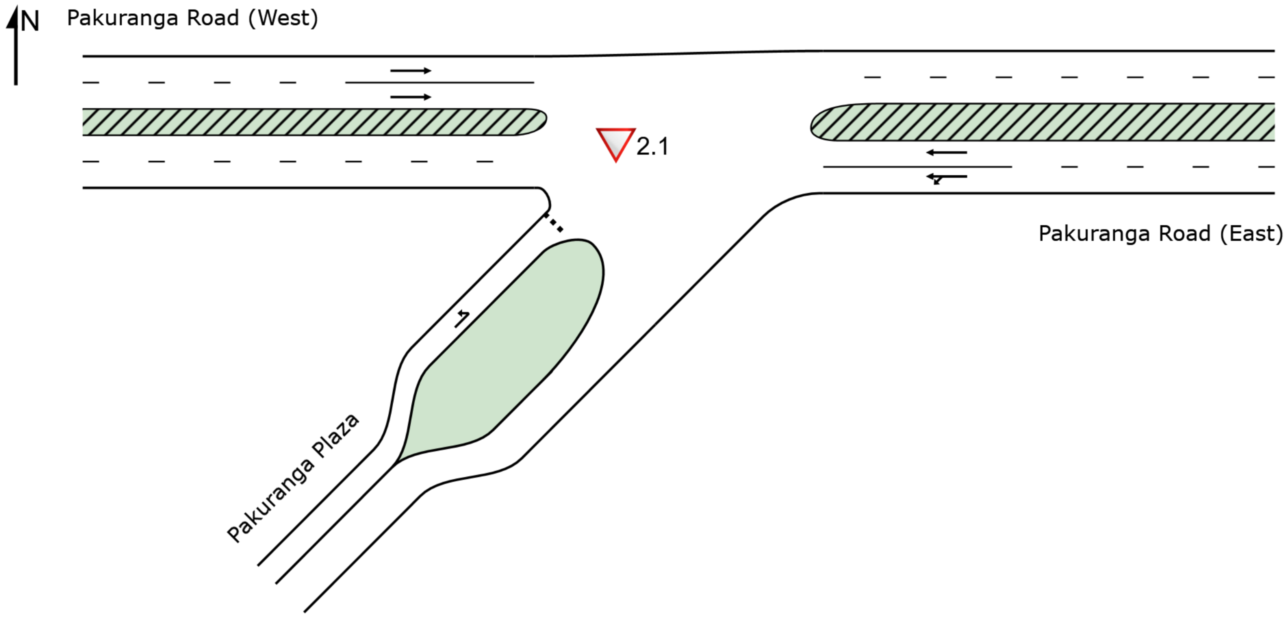


# SITE LAYOUT

## ▽ Site: 2.1 [2.1 Pakuranga Plaza / Pakuranga Rd (Site Folder: AM)]

Site Category: (None)
Give-Way (Two-Way)

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

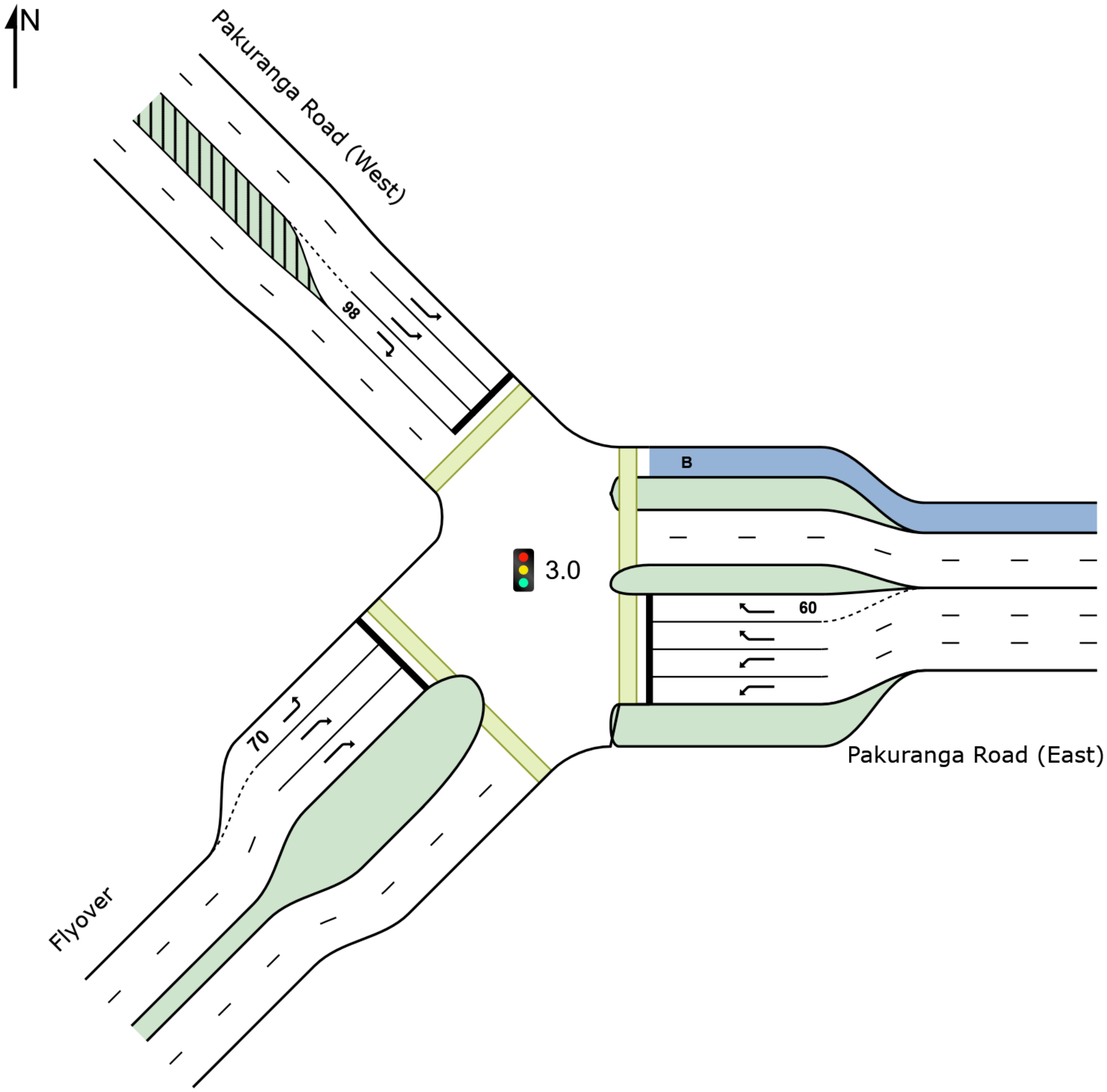


# SITE LAYOUT

## Site: 3.0 [3.0 Pakuranga Highway / Pakuranga Rd (Site Folder: AM)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated

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

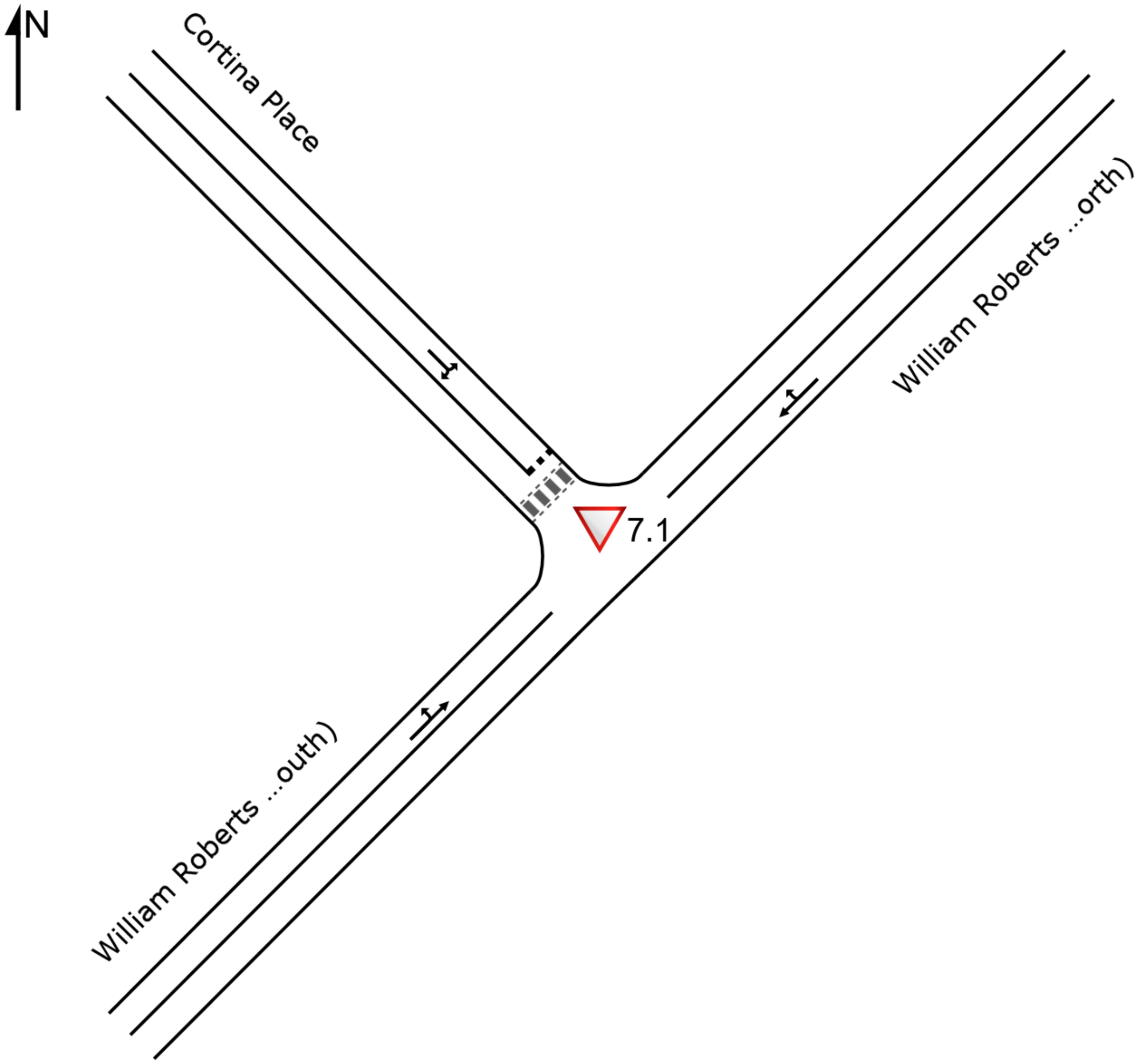


# SITE LAYOUT

**Site: 7.1 [7.1 William Roberts Rd / Cortina Pl (Site Folder: AM)]**

Site Category: (None)
Give-Way (Two-Way)

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

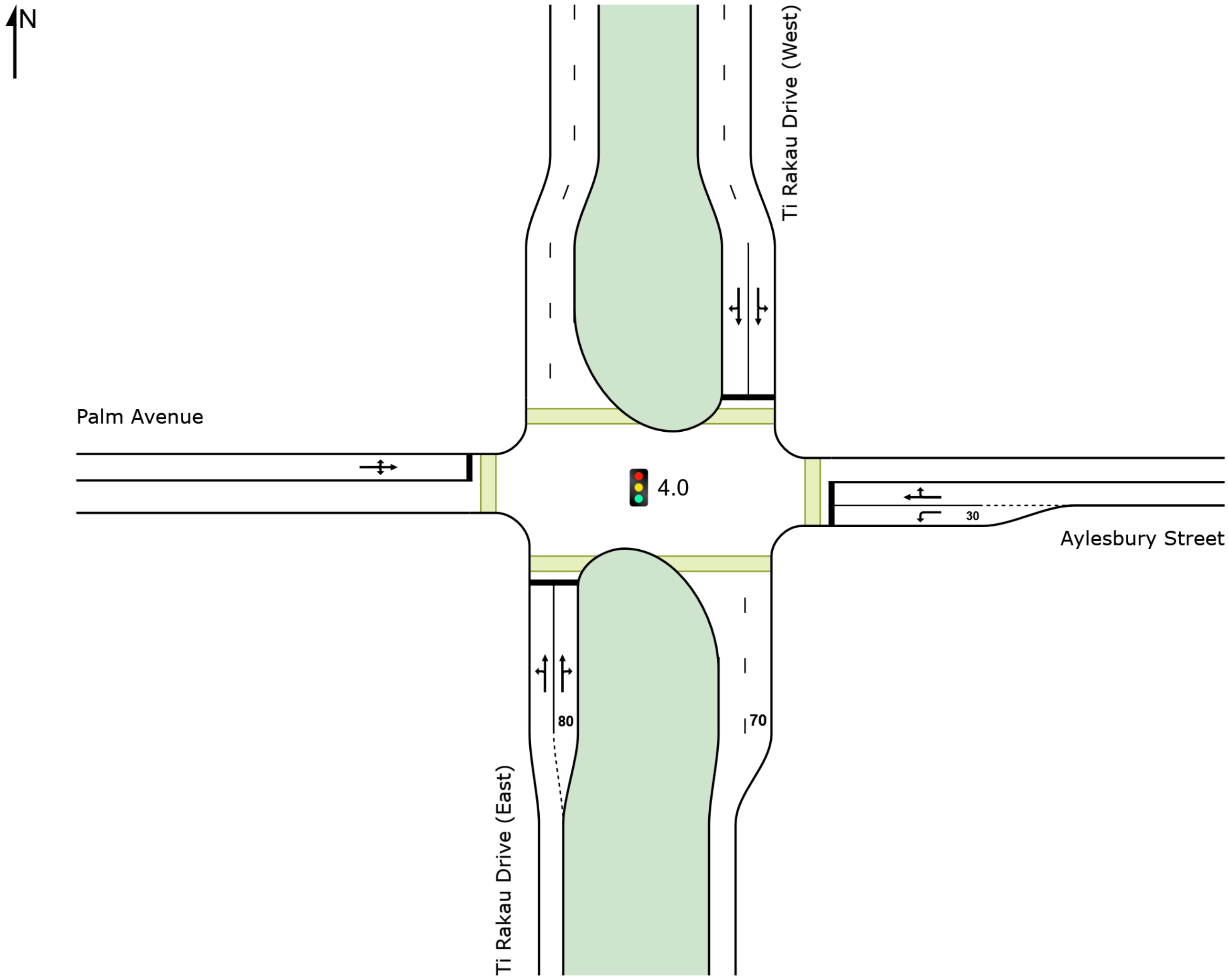


# SITE LAYOUT

## Site: 4.0 [4.0 Palm Ave / Aylesbury St (Site Folder: AM)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated

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

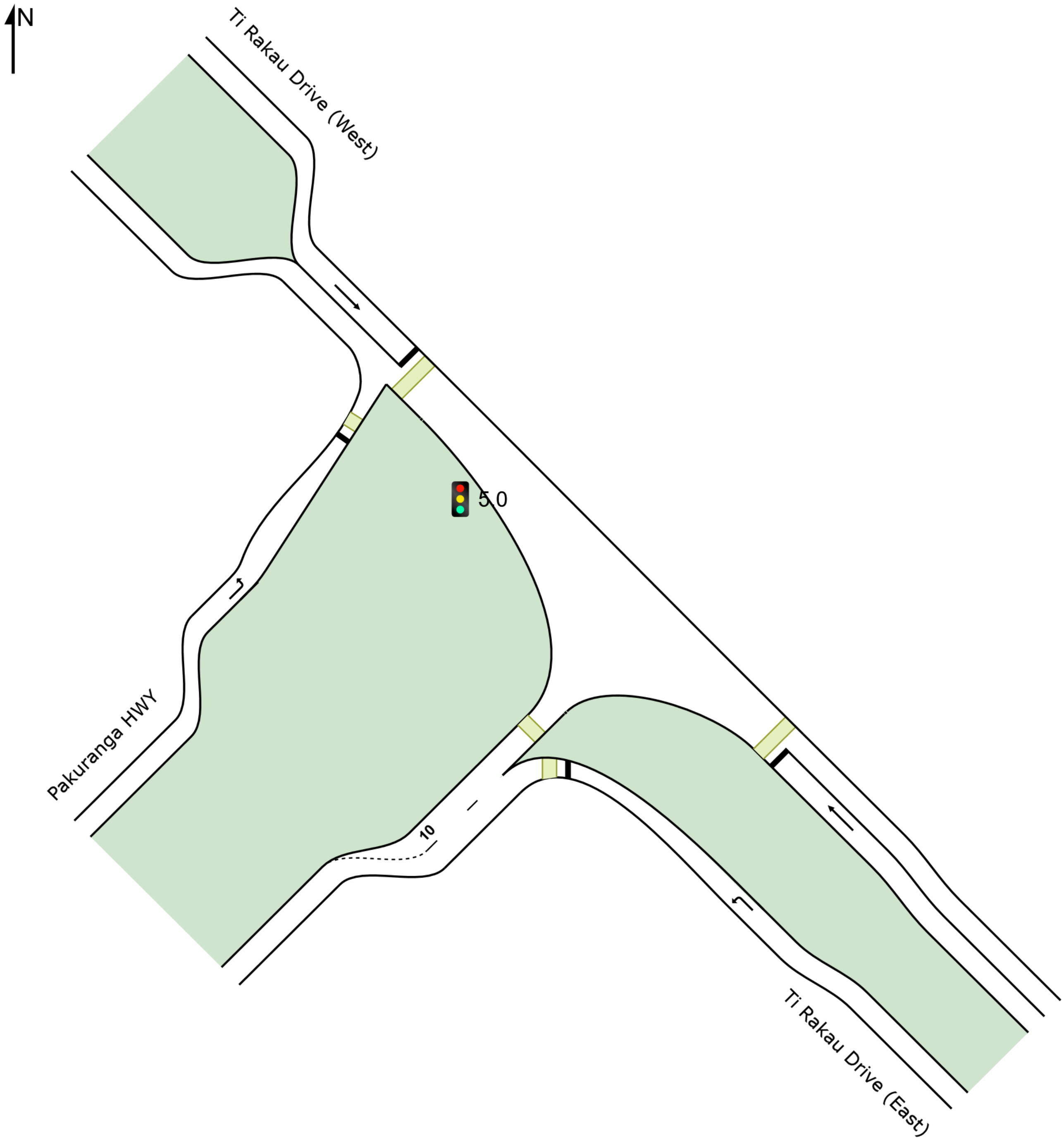


# SITE LAYOUT

## Site: 5.0 [5.0 Pakuranga Highway/ Reeves Rd (Site Folder: AM)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated

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

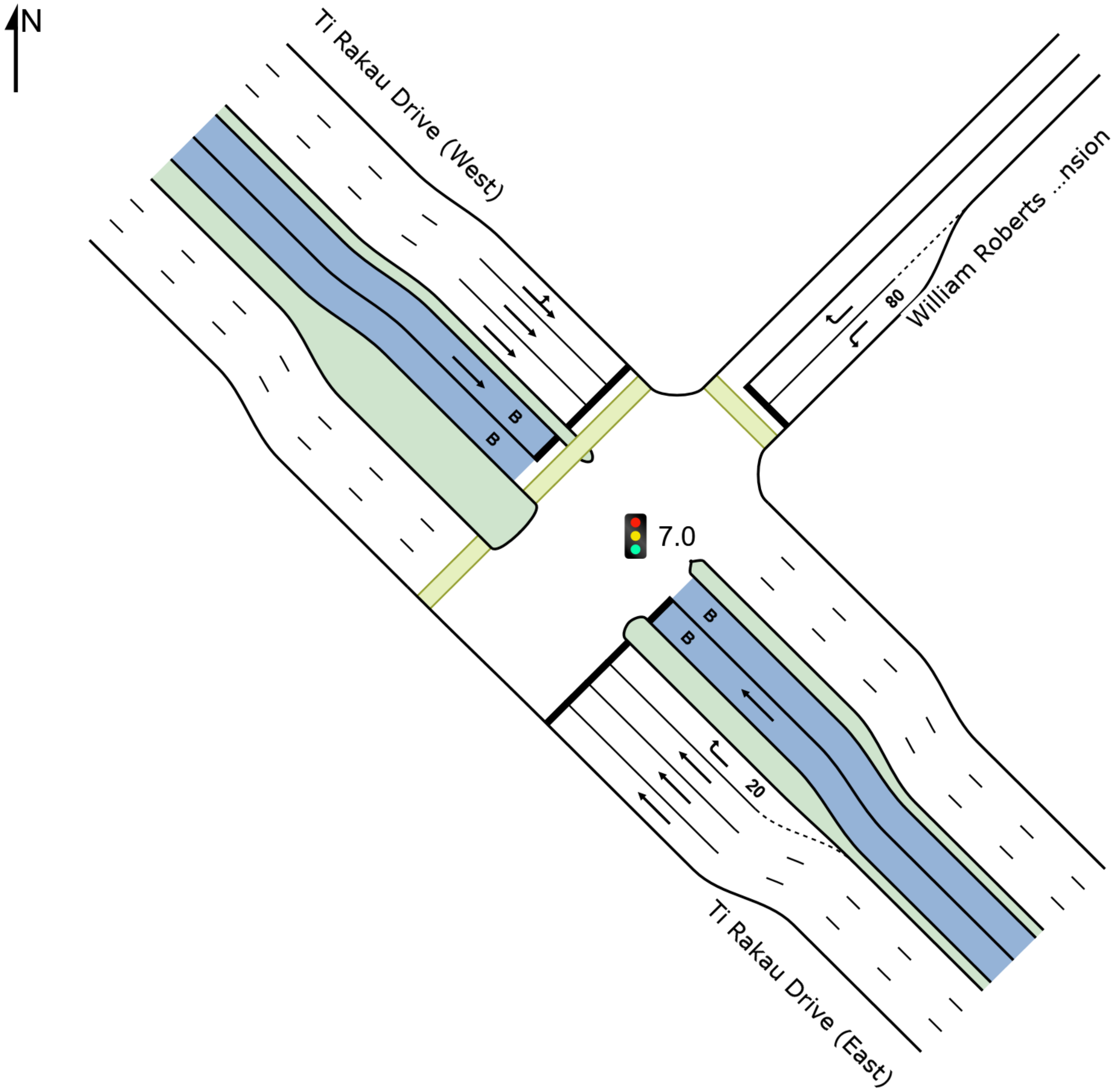


# SITE LAYOUT

## Site: 7.0 [7.0 William Roberts Rd / Ti Rakau Dr (Site Folder: AM)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated

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





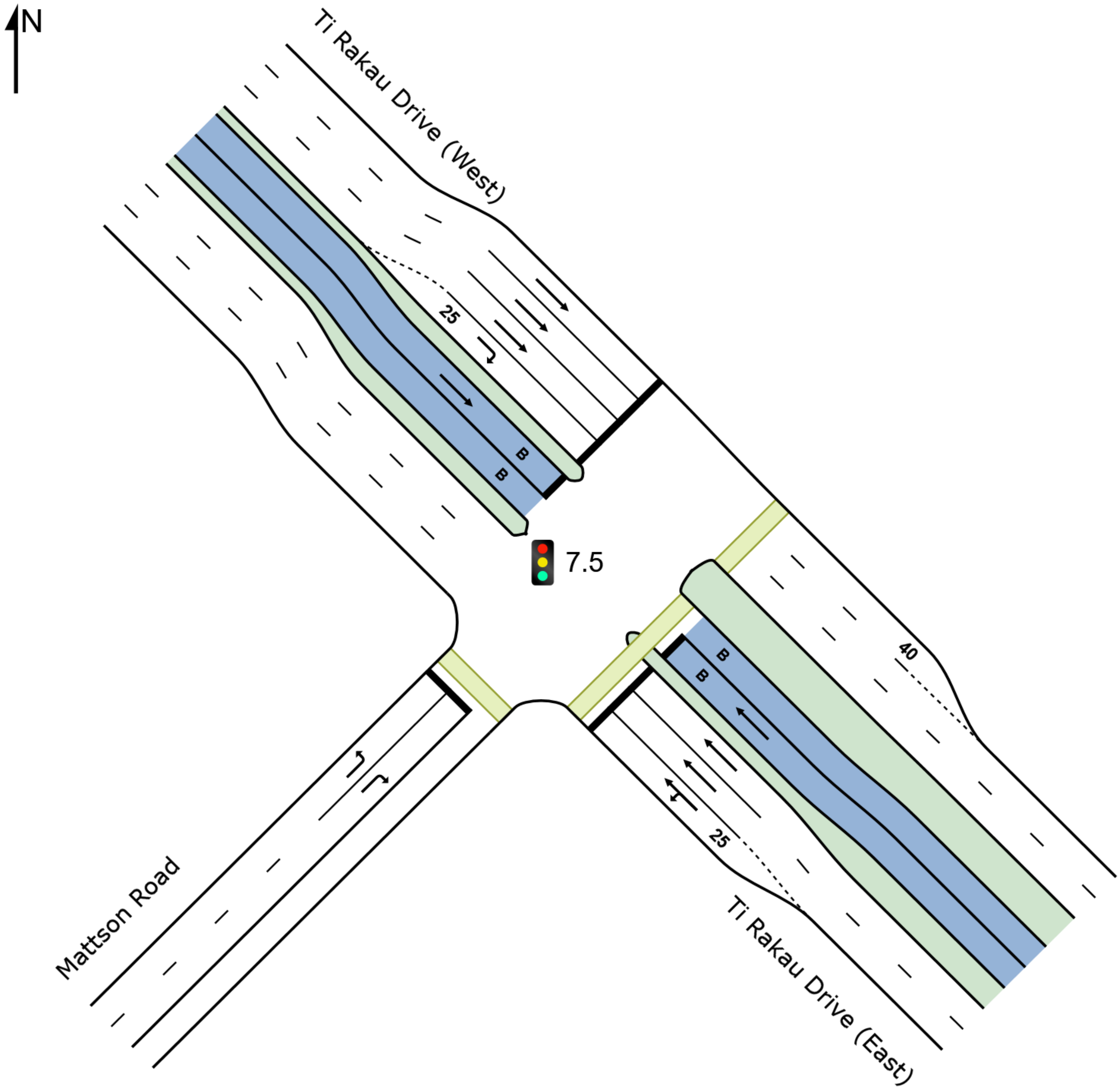
Organisation: AECOM AUSTRALIA PTY LTD | Licence: NETWORK / Enterprise | Created: Monday, 16 May 2022 3:49:35 pm
Project: C:\Users\jacques.vandenheever\Downloads\2028 Construction 3 AM_40.sip9

# SITE LAYOUT

## Site: 7.5 [7.5 Mattson Rd/ Ti Rakau Dr (Site Folder: AM)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated

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

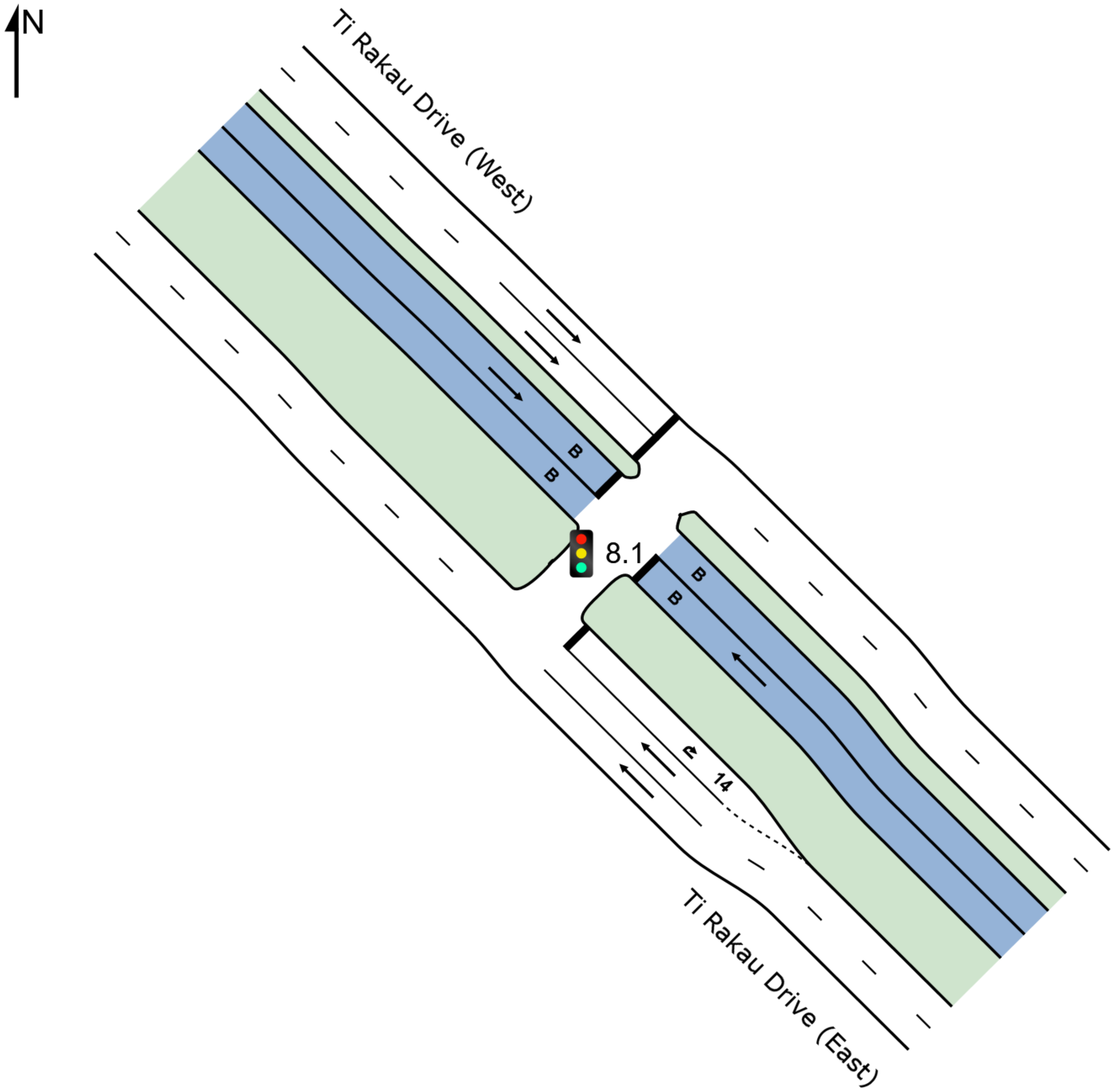


# SITE LAYOUT

## Site: 8.1 [8.1 U-turn - West of Marriot Rd (Site Folder: AM)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated

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

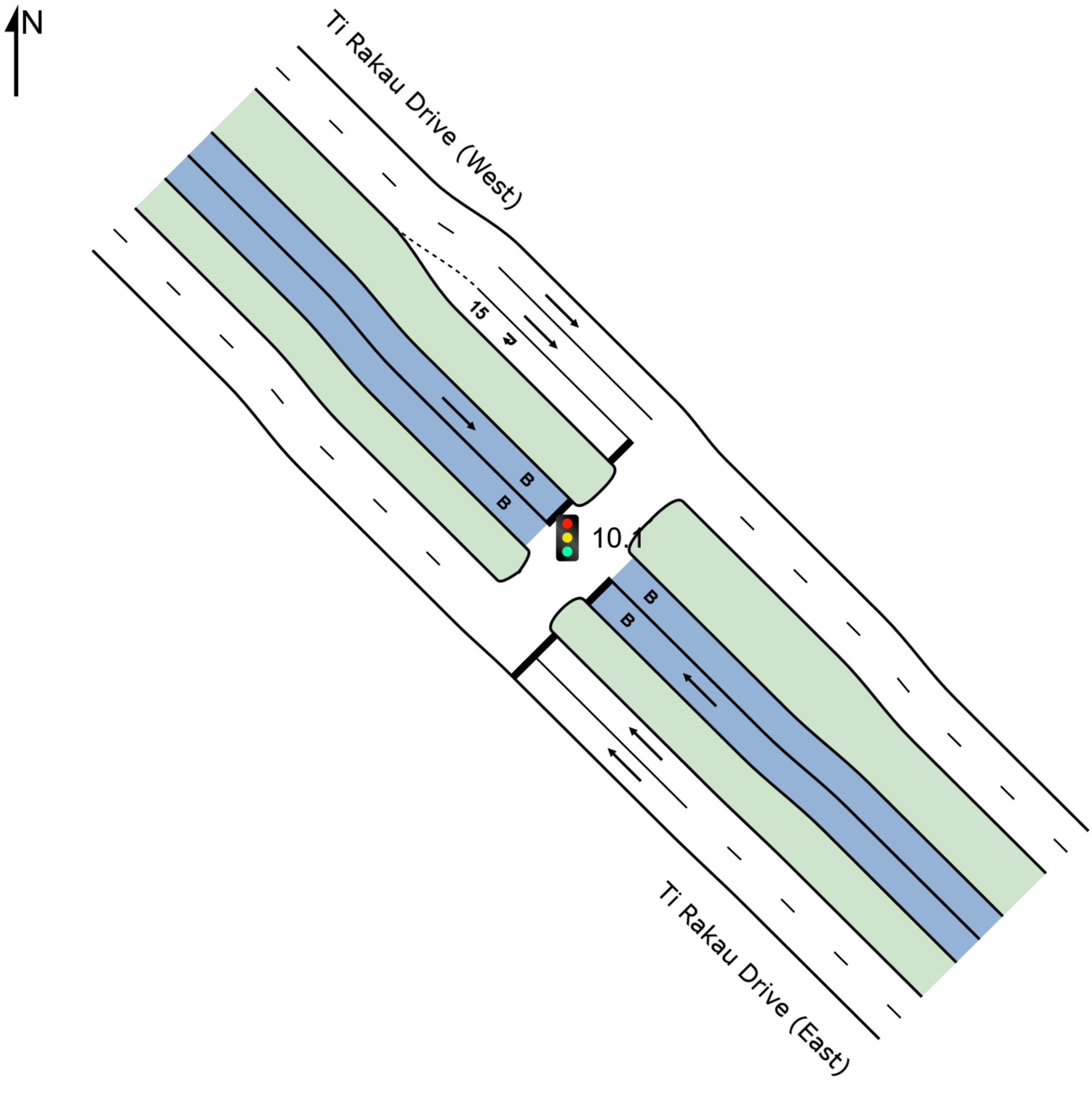


# SITE LAYOUT

## Site: 10.1 [10.1 U-turn - East of Edgewater Dr (West) (Site Folder: AM)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated

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

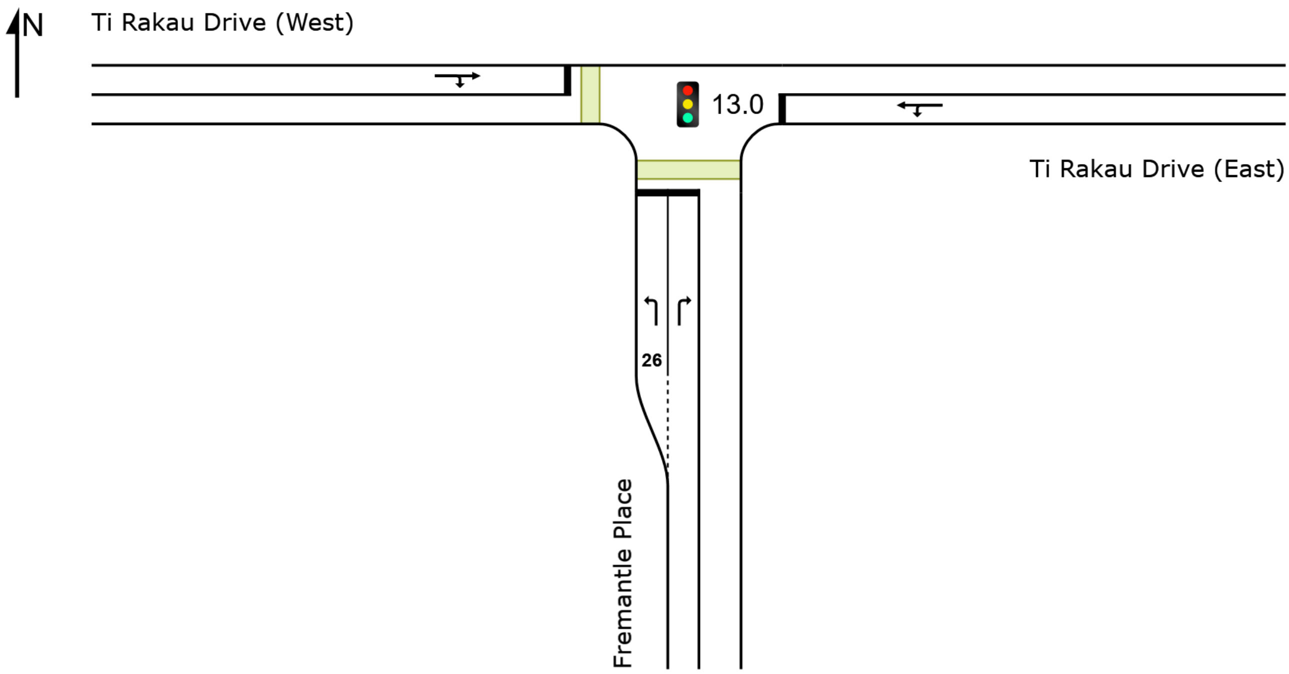


# SITE LAYOUT

## Site: 13.0 [13.0 Gossamer Dr / Ti Rakau Dr Closure (Site Folder: AM)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated

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



# PHASING SUMMARY

## Site: 1.0 [1.0 Pakuranga Rd / Ti Rakau Dr (Site Folder: AM)]

## Network: N101 [AM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated    Cycle Time = 110 seconds (Site Practical Cycle Time)

**Timings based on settings in the Site Phasing & Timing dialog**
**Phase Times determined by the program**
**Downstream lane blockage effects included in determining phase times**
**Phase Sequence: Variable Phasing**
**Reference Phase: Phase B**
**Input Phase Sequence: A, B, Bus, D, E**
**Output Phase Sequence: A, B, Bus, D, E**

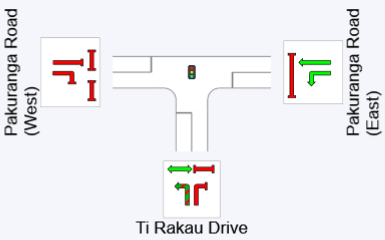
### Phase Timing Summary

| Phase | A | B | Bus | D | E |
|---|---|---|---|---|---|
| Phase Change Time (sec) | 83 | 0 | 21 | 33 | 57 |
| Green Time (sec) | 21 | 15 | 6 | 18 | 20 |
| Phase Time (sec) | 27 | 21 | 12 | 24 | 26 |
| Phase Split | 25% | 19% | 11% | 22% | 24% |

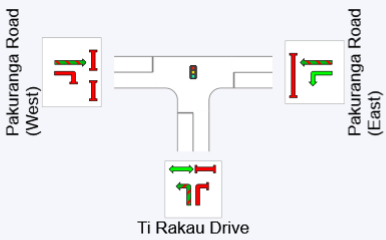
See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified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

### Output Phase Sequence

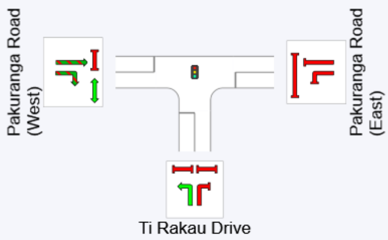
**Phase A**



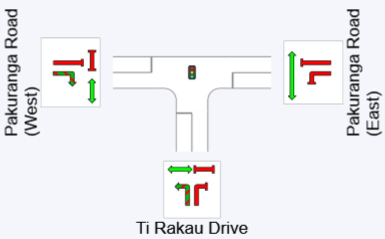

**Phase B** REF



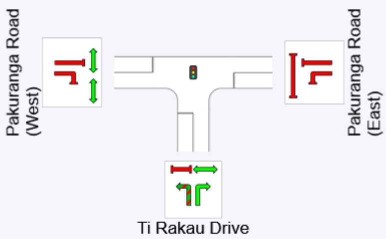

**Phase Bus**




**Phase D**




**Phase E**




REF: Reference Phase
VAR: Variable Phase

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

# PHASING SUMMARY

## Site: 3.0 [3.0 Pakuranga Highway / Pakuranga Rd (Site Folder: AM)]

## Network: N101 [AM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated    Cycle Time = 60 seconds (Site Practical Cycle Time)

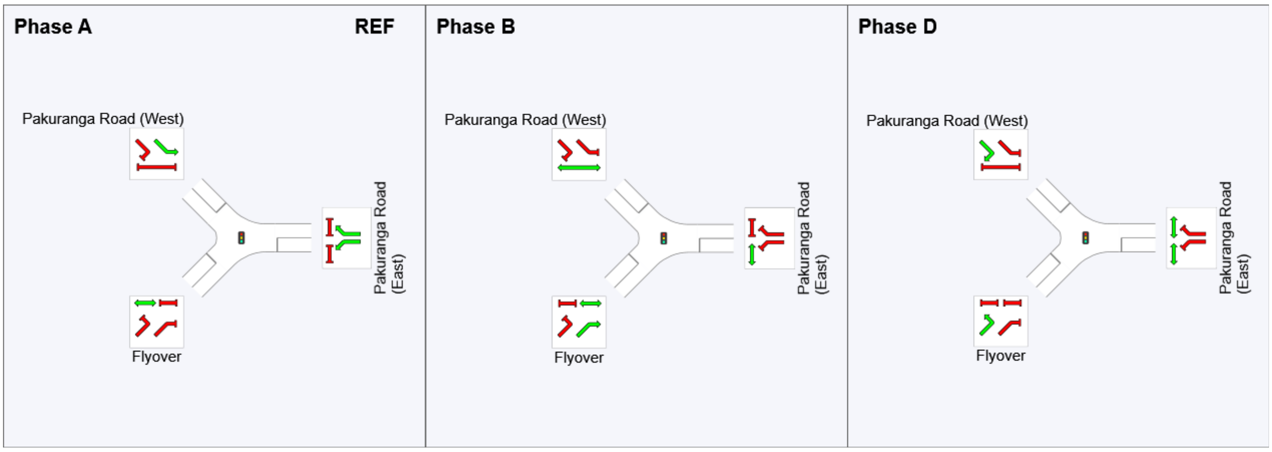
**Timings based on settings in the Site Phasing & Timing dialog**
**Phase Times determined by the program**
**Downstream lane blockage effects included in determining phase times**
**Phase Sequence: Variable Phasing**
**Reference Phase: Phase A**
**Input Phase Sequence: A, B, D**
**Output Phase Sequence: A, B, D**

## Phase Timing Summary

| Phase | A | B | D |
|---|---|---|---|
| Phase Change Time (sec) | 0 | 28 | 42 |
| Green Time (sec) | 22 | 8 | 12 |
| Phase Time (sec) | 28 | 14 | 18 |
| Phase Split | 47% | 23% | 30% |

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

## Output Phase Sequence




REF: Reference Phase
VAR: Variable Phase

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

# PHASING SUMMARY

**Site: 4.0 [4.0 Palm Ave / Aylesbury St (Site Folder: AM)]**

**Network: N101 [AM (Network Folder: General)]**

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated    Cycle Time = 70 seconds (Site Practical Cycle Time)

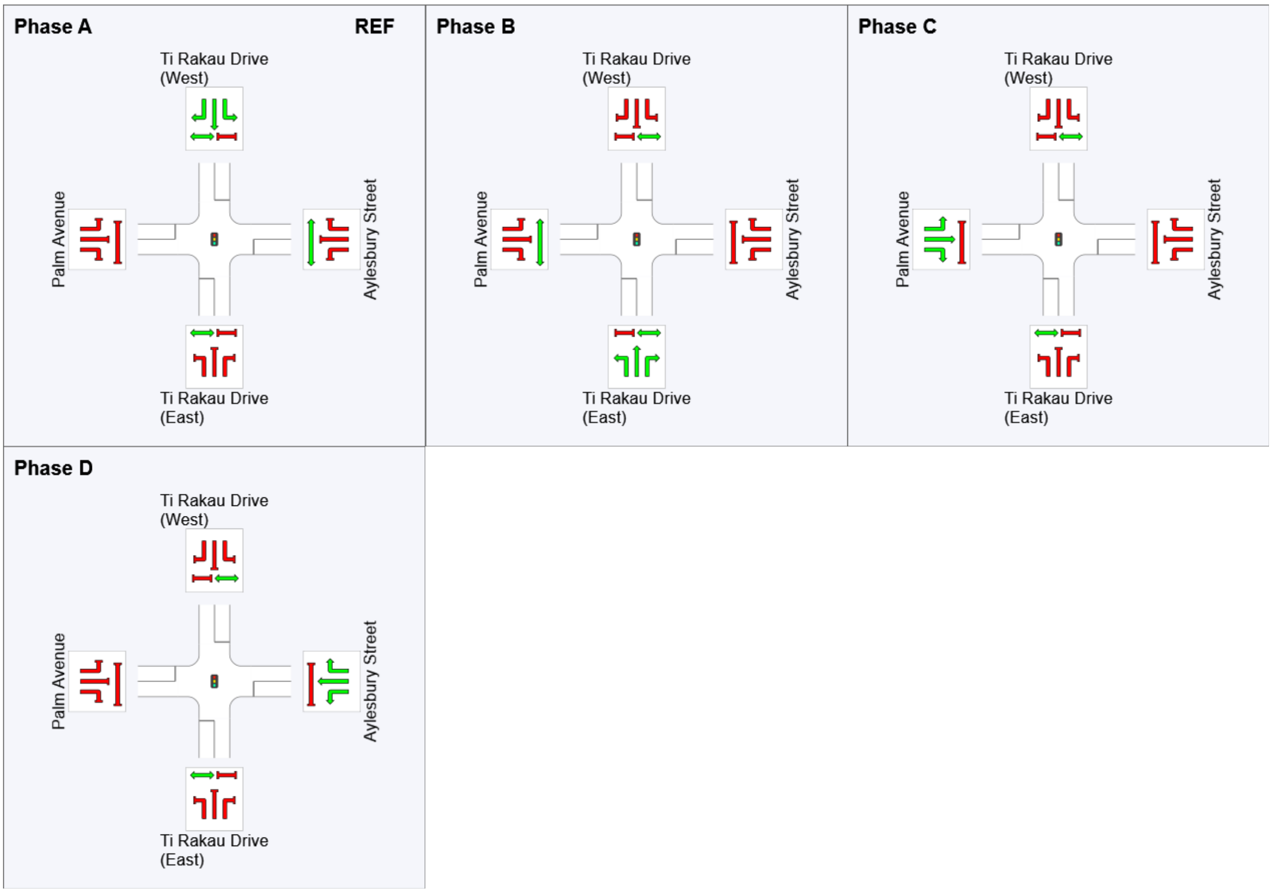
**Timings based on settings in the Site Phasing & Timing dialog**
**Phase Times determined by the program**
**Downstream lane blockage effects included in determining phase times**
**Green Split Priority has been specified**
**Phase Sequence: Variable Phasing**
**Reference Phase: Phase A**
**Input Phase Sequence: A, B, C, D**
**Output Phase Sequence: A, B, C, D**

## Phase Timing Summary

| Phase | A | B | C | D |
|---|---|---|---|---|
| Phase Change Time (sec) | 0 | 28 | 46 | 58 |
| Green Time (sec) | 22 | 12 | 6 | 6 |
| Phase Time (sec) | 28 | 18 | 12 | 12 |
| Phase Split | 40% | 26% | 17% | 17% |

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

## Output Phase Sequence




REF: Reference Phase
VAR: Variable Phase

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

# PHASING SUMMARY

## Site: 5.0 [5.0 Pakuranga Highway/ Reeves Rd (Site Folder: AM)]

## Network: N101 [AM (Network Folder: General)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated    Cycle Time = 50 seconds (Site Practical Cycle Time)

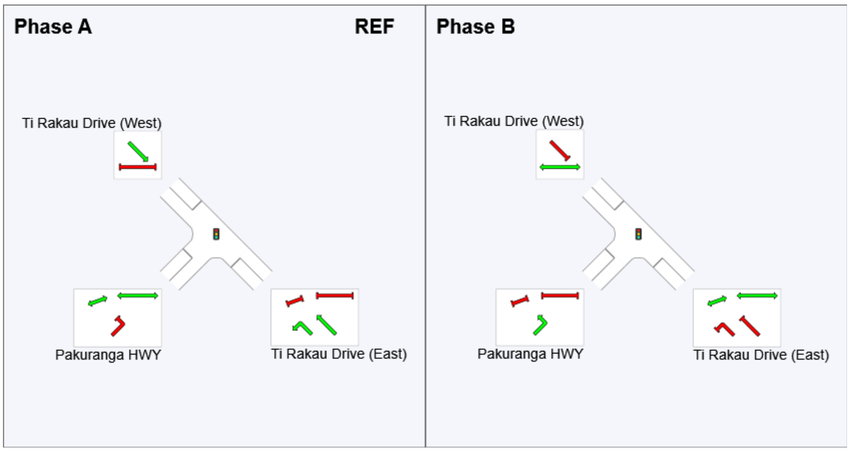
**Timings based on settings in the Site Phasing & Timing dialog**
**Phase Times determined by the program**
**Downstream lane blockage effects included in determining phase times**
**Phase Sequence: Map Extract Default**
**Reference Phase: Phase A**
**Input Phase Sequence: A, B**
**Output Phase Sequence: A, B**

### Phase Timing Summary

| Phase | **A** | **B** |
|---|---|---|
| Phase Change Time (sec) | 0 | 35 |
| Green Time (sec) | 29 | 9 |
| Phase Time (sec) | 35 | 15 |
| Phase Split | 70% | 30% |

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

### Output Phase Sequence




REF: Reference Phase
VAR: Variable Phase

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

# PHASING SUMMARY

## Site: 8.1 [8.1 U-turn - West of Marriot Rd (Site Folder: AM)]

Network: N101 [AM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated    Cycle Time = 30 seconds (Site Practical Cycle Time)

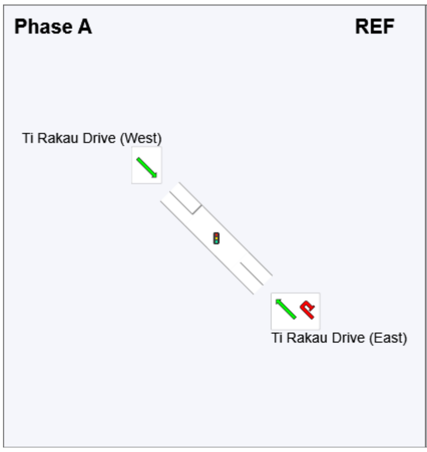
**Timings based on settings in the Site Phasing & Timing dialog**
**Phase Times determined by the program**
**Downstream lane blockage effects included in determining phase times**
**Phase Sequence: Opposed Turns**
**Reference Phase: Phase A**
**Input Phase Sequence: A, B**
**Output Phase Sequence: A, B**

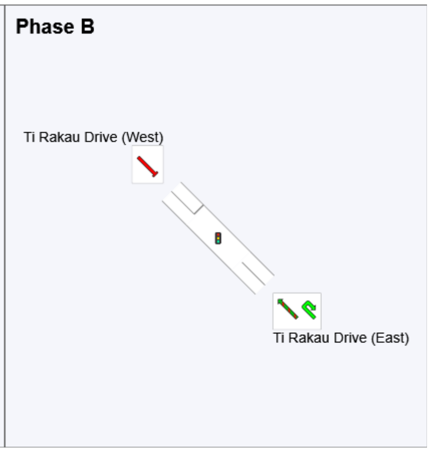
## Phase Timing Summary

| Phase | **A** | **B** |
|---|---|---|
| Phase Change Time (sec) | 0 | 18 |
| Green Time (sec) | 12 | 6 |
| Phase Time (sec) | 18 | 12 |
| Phase Split | 60% | 40% |

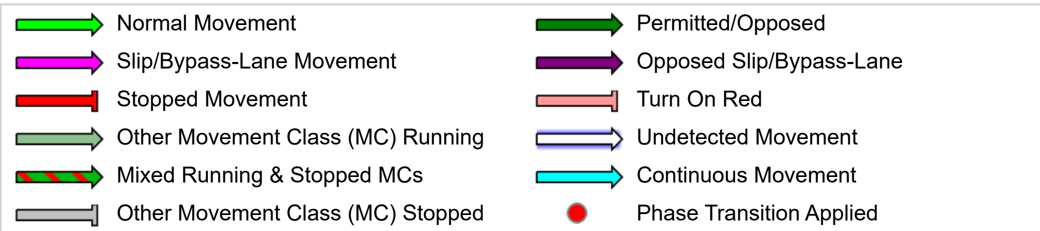
See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified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

## Output Phase Sequence




REF: Reference Phase
VAR: Variable Phase



# PHASING SUMMARY

## Site: 10.1 [10.1 U-turn - East of Edgewater Dr (West) (Site Folder: AM)]

## Network: N101 [AM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated    Cycle Time = 30 seconds (Site Practical Cycle Time)

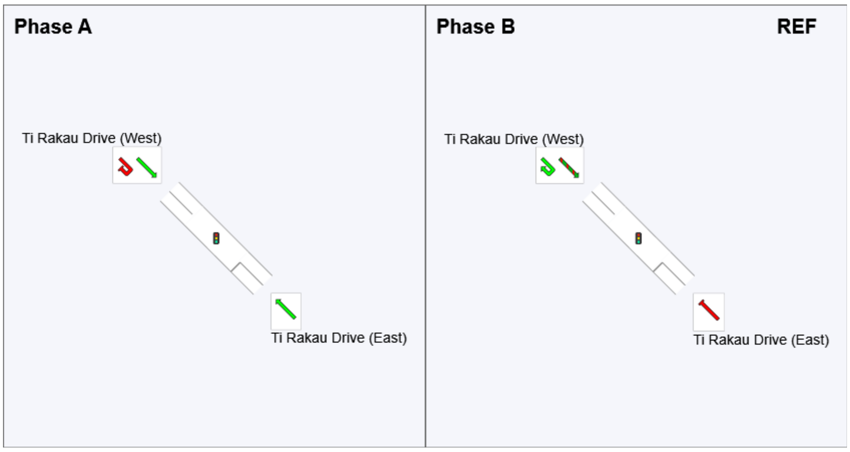
**Timings based on settings in the Site Phasing & Timing dialog**
**Phase Times determined by the program**
**Downstream lane blockage effects included in determining phase times**
**Phase Sequence: Opposed Turns**
**Reference Phase: Phase B**
**Input Phase Sequence: A, B**
**Output Phase Sequence: A, B**

### Phase Timing Summary

| Phase | **A** | **B** |
|---|---|---|
| Phase Change Time (sec) | 12 | 0 |
| Green Time (sec) | 12 | 6 |
| Phase Time (sec) | 18 | 12 |
| Phase Split | 60% | 40% |

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

### Output Phase Sequence




REF: Reference Phase
VAR: Variable Phase

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


Organisation: AECOM AUSTRALIA PTY LTD | Licence: NETWORK / Enterprise | Processed: Wednesday, 16 February 2022 9:16:52 am
Project: C:\Users\jacques.vandenheever\Downloads\2028 Construction 3 AM_40.sip9

# PHASING SUMMARY

## Site: 13.0 [13.0 Gossamer Dr / Ti Rakau Dr Closure (Site Folder: AM)]

## Network: N101 [AM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated    Cycle Time = 150 seconds (Site Practical Cycle Time)

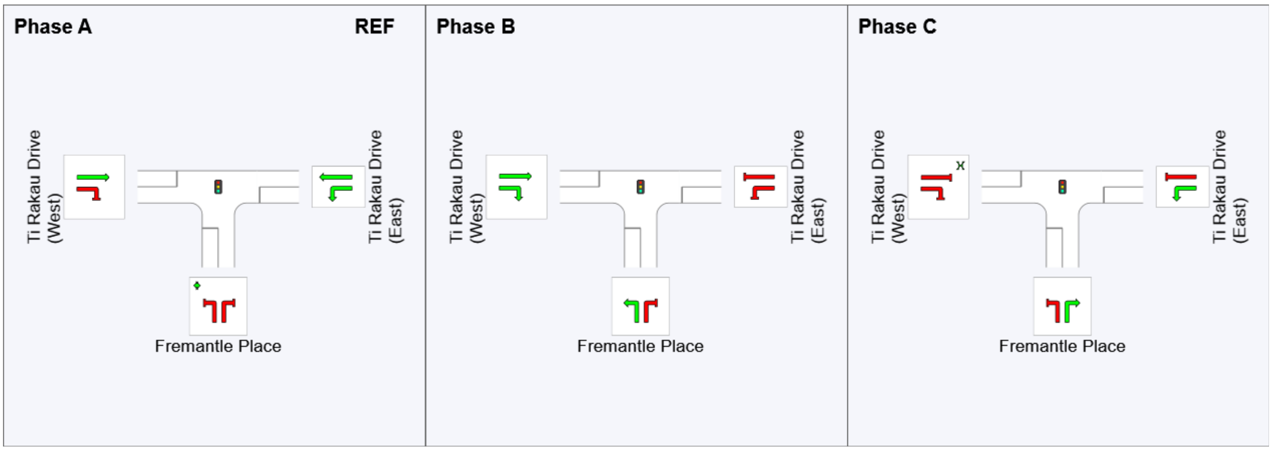
**Timings based on settings in the Site Phasing & Timing dialog**
**Phase Times determined by the program**
**Downstream lane blockage effects included in determining phase times**
**Green Split Priority has been specified**
**Phase Sequence: Variable Phasing**
**Reference Phase: Phase A**
**Input Phase Sequence: A, B, C**
**Output Phase Sequence: A, B, C**

## Phase Timing Summary

| Phase | A | B | C |
|---|---|---|---|
| Phase Change Time (sec) | 0 | 105 | 135 |
| Green Time (sec) | 99 | 24 | 9 |
| Phase Time (sec) | 105 | 30 | 15 |
| Phase Split | 70% | 20% | 10% |

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

## Output Phase Sequence




REF: Reference Phase
VAR: Variable Phase

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

# CCG PHASING SUMMARY

## Common Control Group: CCG2 [WRR / Mattson]

## Network: N101 [AM (Network Folder: General)]

EQUISAT (Fixed-Time/SCATS) Isolated     Cycle Time = 50 seconds (CCG Practical Cycle Time)

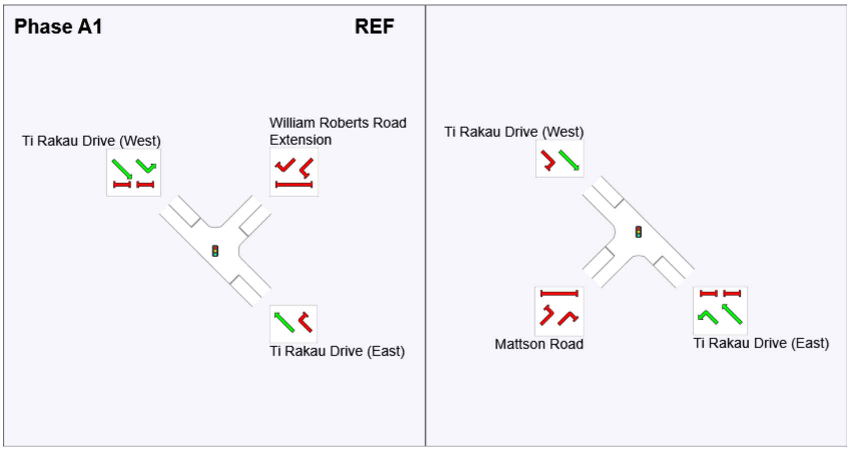
**Timings based on settings in the Network Timing dialog**
**Phase Times determined by the program**
**Downstream lane blockage effects included in determining phase times**
**Phase Sequence: CCG Phasing (phase reduction applied)**
**Reference Phase: Phase A1**
**Input Phase Sequence: A1, A2, B, C, D**
**Output Phase Sequence: A1, B, C, D**

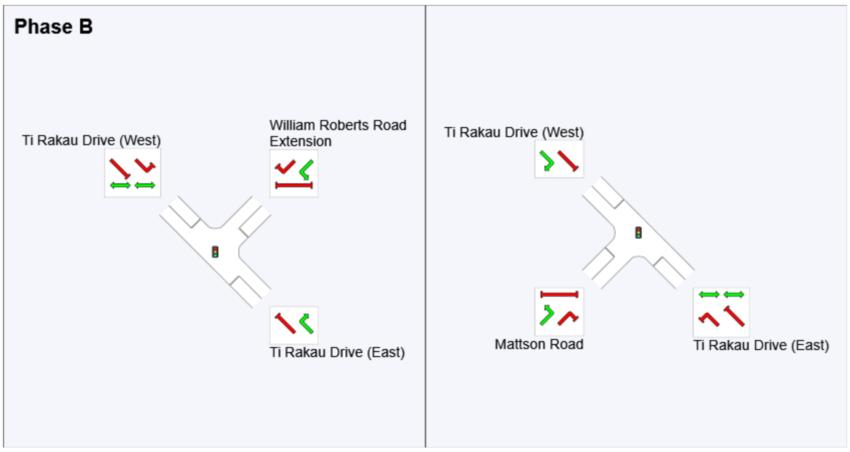
## Phase Timing Summary (CCG)

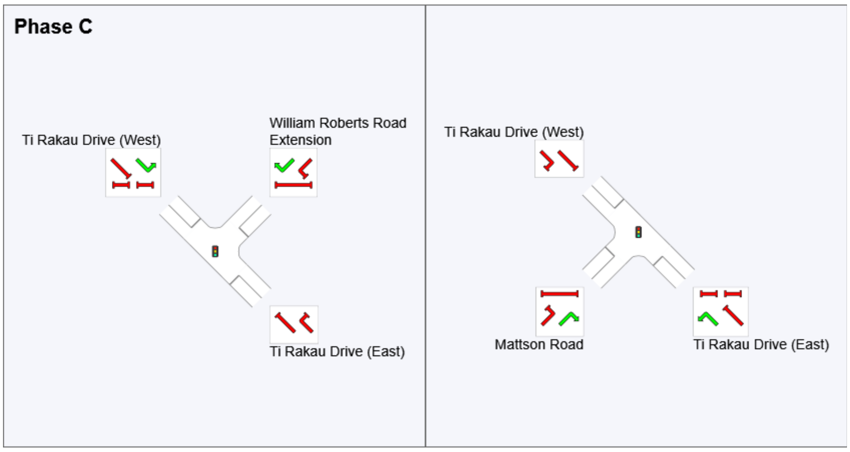
| Phase | A1 | B | C | D |
|---|---|---|---|---|
| Phase Change Time (sec) | 0 | 15 | 28 | 40 |
| Green Time (sec) | 9 | 7 | 6 | 4 |
| Phase Time (sec) | 15 | 13 | 12 | 10 |
| Phase Split | 30% | 26% | 24% | 20% |

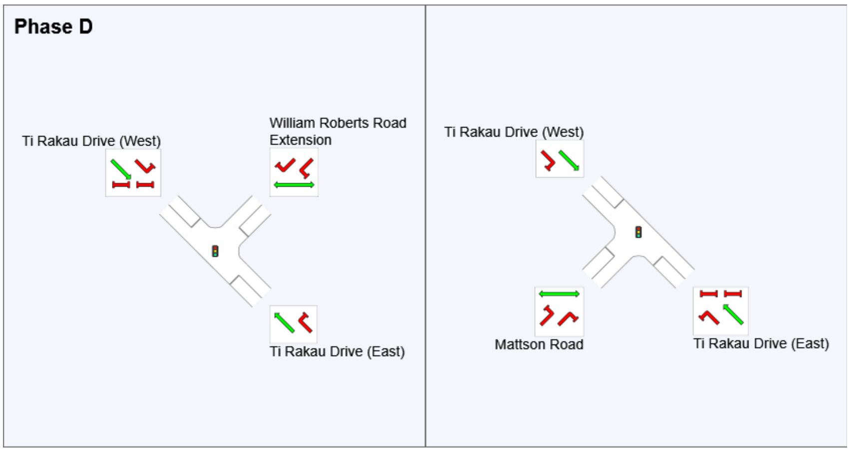
See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified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

## Output Phase Sequence (CCG)

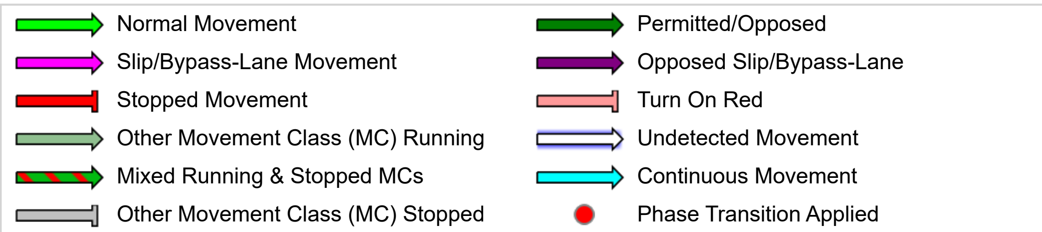





REF: Reference Phase
VAR: Variable Phase



# PHASING SUMMARY

**Site: 1.0 [1.0 Pakuranga Rd / Ti Rakau Dr (Site Folder: PM)]**

**Network: N101 [PM (Network Folder: General)]**

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated    Cycle Time = 120 seconds (Site Practical Cycle Time)

**Timings based on settings in the Site Phasing & Timing dialog**
**Phase Times determined by the program**
**Downstream lane blockage effects included in determining phase times**
**Phase Sequence: Variable Phasing**
**Reference Phase: Phase A**
**Input Phase Sequence: B, A, Bus, E, D**
**Output Phase Sequence: B, A, Bus, E, D**

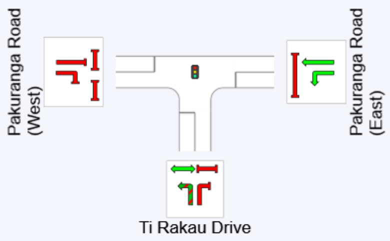
## Phase Timing Summary

| Phase | B | A | Bus | E | D |
|---|---|---|---|---|---|
| Phase Change Time (sec) | 108 | 0 | 44 | 56 | 83 |
| Green Time (sec) | 6 | 38 | 6 | 21 | 19 |
| Phase Time (sec) | 12 | 44 | 12 | 27 | 25 |
| Phase Split | 10% | 37% | 10% | 23% | 21% |

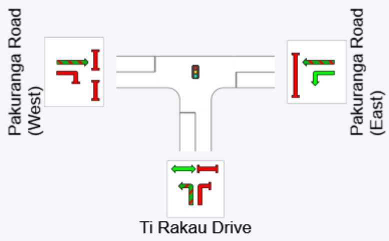
See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified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

## Output Phase Sequence

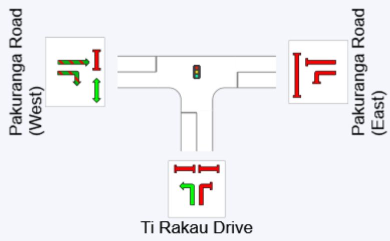
**Phase B**



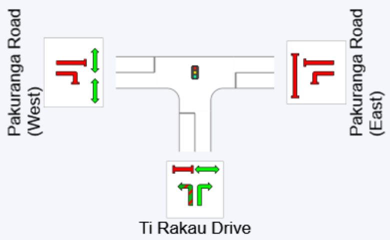

**Phase A** **REF**



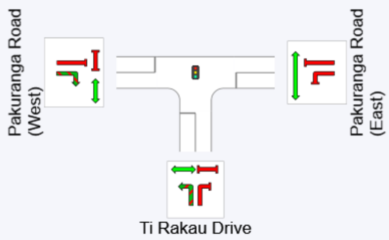

**Phase Bus**




**Phase E**




**Phase D**




REF: Reference Phase
VAR: Variable Phase

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

# PHASING SUMMARY

## Site: 3.0 [3.0 Pakuranga Highway / Pakuranga Rd (Site Folder: PM)]

## Network: N101 [PM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated    Cycle Time = 134 seconds (Site User-Given Phase Times)

**Timings based on settings in the Site Phasing & Timing dialog**
**Phase Times specified by the user**
**Phase Sequence: Variable Phasing**
**Reference Phase: Phase A**
**Input Phase Sequence: A, D, B, C**
**Output Phase Sequence: A, D, B, C**

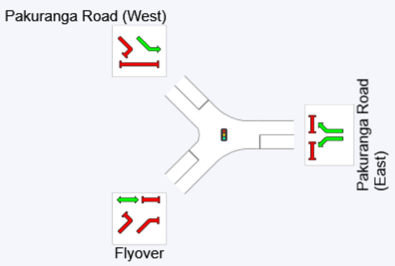
## Phase Timing Summary

| Phase | A | D | B | C |
|---|---|---|---|---|
| Phase Change Time (sec) | 0 | 43 | 100 | 120 |
| Green Time (sec) | 40 | 51 | 14 | 9 |
| Phase Time (sec) | 46 | 57 | 19 | 12 |
| Phase Split | 34% | 43% | 14% | 9% |

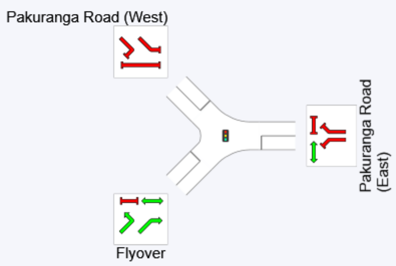
See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified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

## Output Phase Sequence

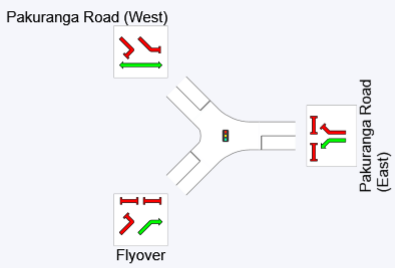
**Phase A** **REF**



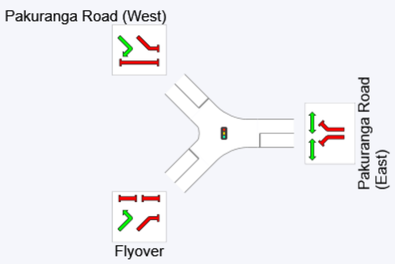

**Phase D**




**Phase B**




**Phase C**




REF: Reference Phase
VAR: Variable Phase

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

# PHASING SUMMARY

## Site: 4.0 [4.0 Palm Ave / Aylesbury St (Site Folder: PM)]

## Network: N101 [PM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated   Cycle Time = 100 seconds (Site Practical Cycle Time)

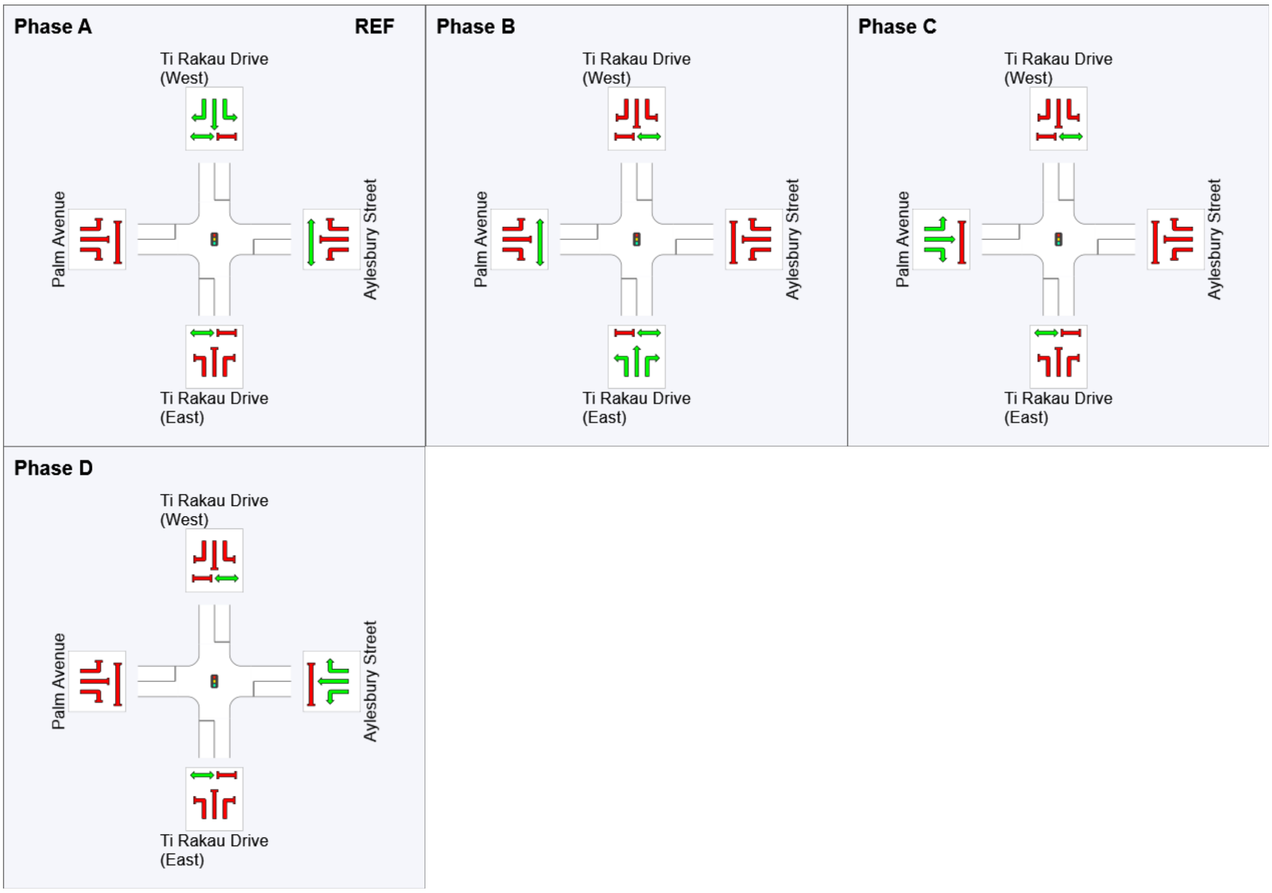
**Timings based on settings in the Site Phasing & Timing dialog**
**Phase Times determined by the program**
**Downstream lane blockage effects included in determining phase times**
**Green Split Priority has been specified**
**Phase Sequence: Variable Phasing**
**Reference Phase: Phase A**
**Input Phase Sequence: A, B, C, D**
**Output Phase Sequence: A, B, C, D**

### Phase Timing Summary

| Phase | A | B | C | D |
|---|---|---|---|---|
| Phase Change Time (sec) | 0 | 53 | 76 | 88 |
| Green Time (sec) | 47 | 17 | 6 | 6 |
| Phase Time (sec) | 53 | 23 | 12 | 12 |
| Phase Split | 53% | 23% | 12% | 12% |

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

### Output Phase Sequence




REF: Reference Phase
VAR: Variable Phase

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

# PHASING SUMMARY

## Site: 5.0 [5.0 Pakuranga Highway/ Reeves Rd (Site Folder: PM)]

## Network: N101 [PM (Network Folder: General)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated    Cycle Time = 40 seconds (Site Practical Cycle Time)

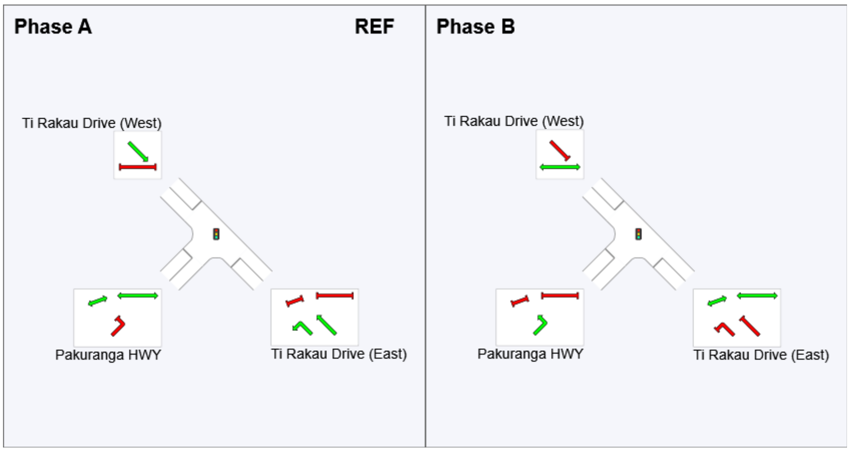
**Timings based on settings in the Site Phasing & Timing dialog**
**Phase Times determined by the program**
**Downstream lane blockage effects included in determining phase times**
**Phase Sequence: Map Extract Default**
**Reference Phase: Phase A**
**Input Phase Sequence: A, B**
**Output Phase Sequence: A, B**

## Phase Timing Summary

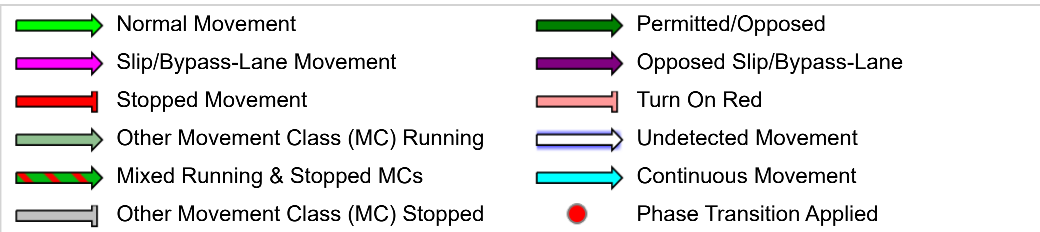
| Phase | A | B |
|---|---|---|
| Phase Change Time (sec) | 0 | 28 |
| Green Time (sec) | 22 | 6 |
| Phase Time (sec) | 28 | 12 |
| Phase Split | 70% | 30% |

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

## Output Phase Sequence




REF: Reference Phase
VAR: Variable Phase



# CCG PHASING SUMMARY

## Common Control Group: CCG2 [WRR / Mattson]

## Network: N101 [PM (Network Folder: General)]

EQUISAT (Fixed-Time/SCATS) Isolated    Cycle Time = 50 seconds (CCG Practical Cycle Time)

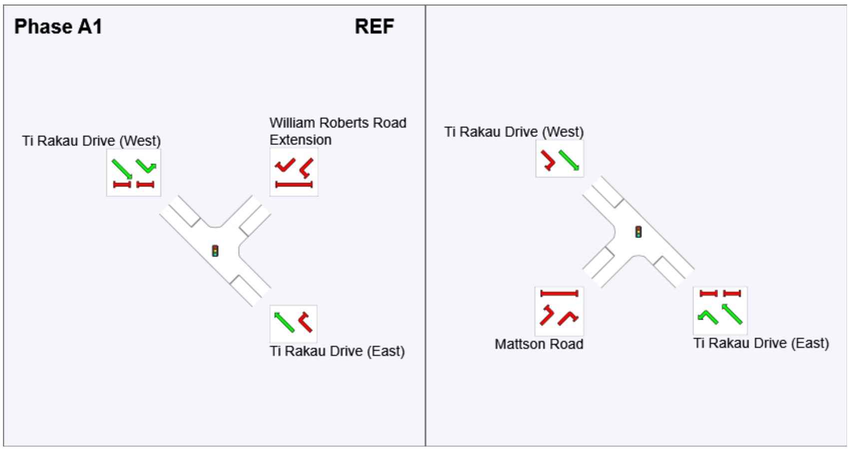
**Timings based on settings in the Network Timing dialog**
**Phase Times determined by the program**
**Downstream lane blockage effects included in determining phase times**
**Phase Sequence: CCG Phasing**
**Reference Phase: Phase A1**
**Input Phase Sequence: A1, B, C, D**
**Output Phase Sequence: A1, B, C, D**

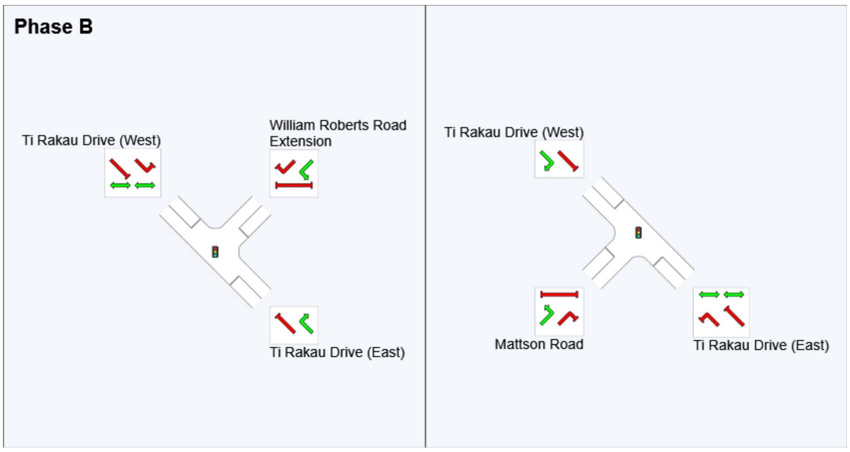
## Phase Timing Summary (CCG)

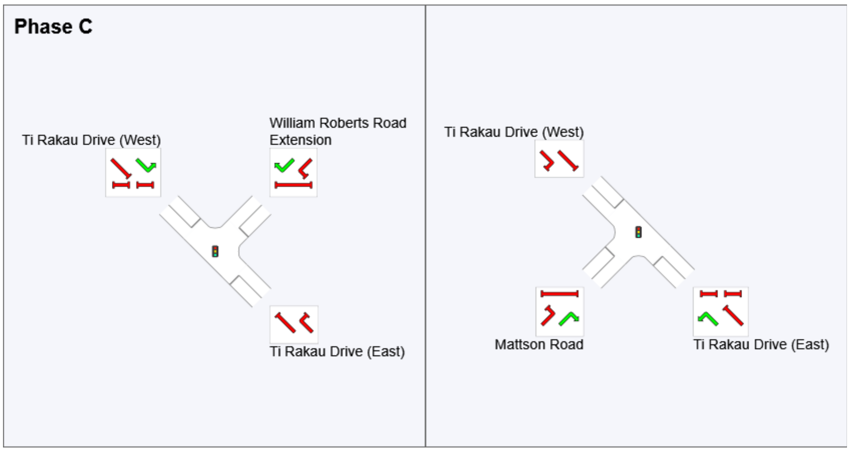
| Phase | A1 | B | C | D |
|---|---|---|---|---|
| Phase Change Time (sec) | 0 | 12 | 28 | 40 |
| Green Time (sec) | 6 | 10 | 6 | 4 |
| Phase Time (sec) | 12 | 16 | 12 | 10 |
| Phase Split | 24% | 32% | 24% | 20% |

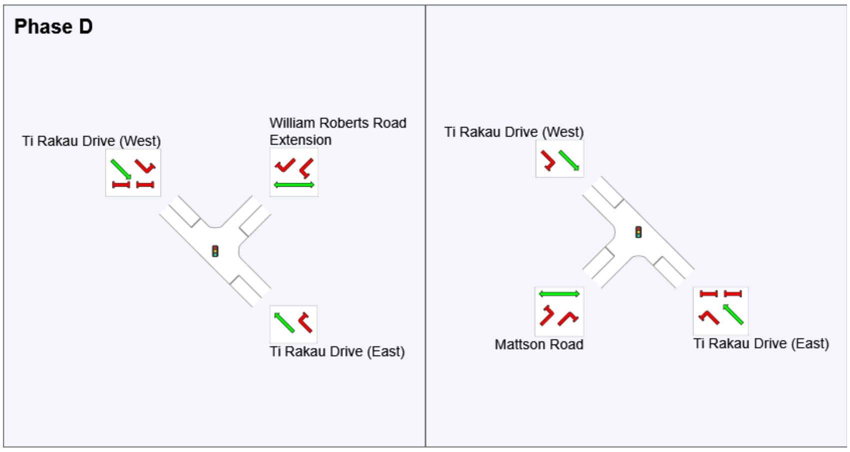
See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified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

## Output Phase Sequence (CCG)

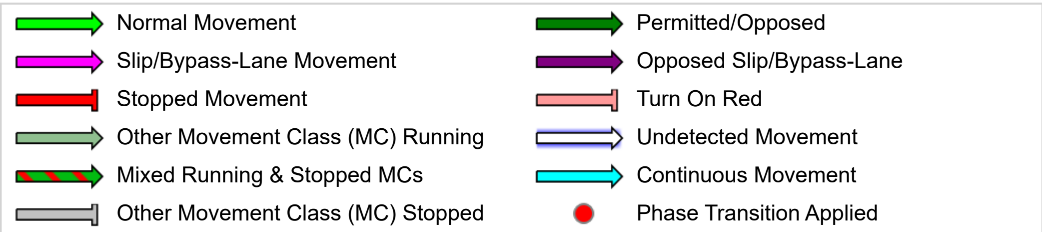





REF: Reference Phase
VAR: Variable Phase



# PHASING SUMMARY

## Site: 8.1 [8.1 U-turn - West of Marriot Rd (Site Folder: PM)]

## Network: N101 [PM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated    Cycle Time = 30 seconds (Site Practical Cycle Time)

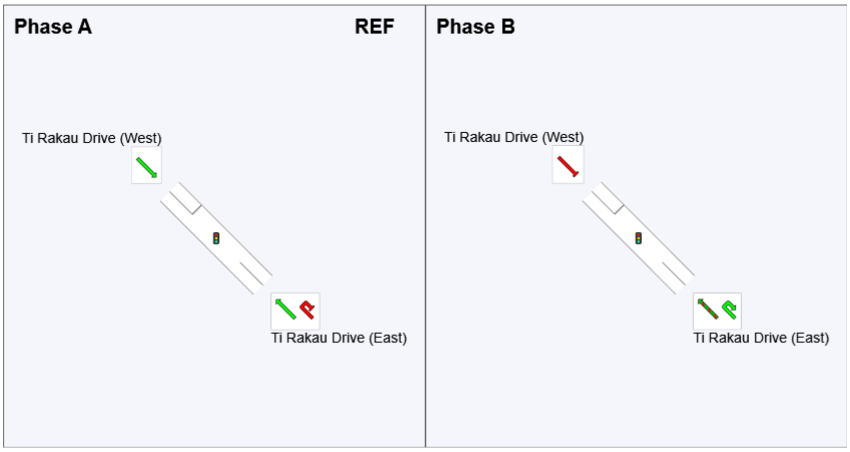
**Timings based on settings in the Site Phasing & Timing dialog**
**Phase Times determined by the program**
**Downstream lane blockage effects included in determining phase times**
**Phase Sequence: Opposed Turns**
**Reference Phase: Phase A**
**Input Phase Sequence: A, B**
**Output Phase Sequence: A, B**

### Phase Timing Summary

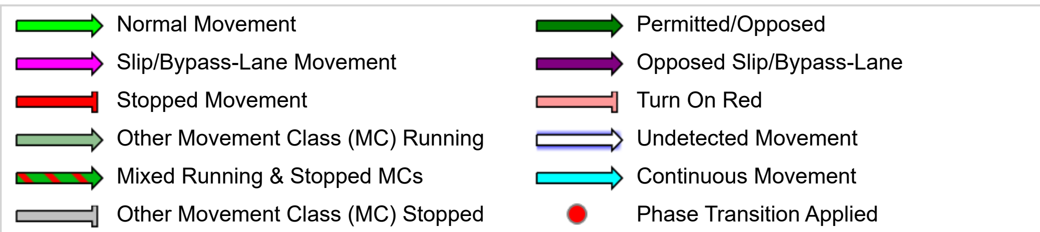
| Phase | A | B |
|---|---|---|
| Phase Change Time (sec) | 0 | 17 |
| Green Time (sec) | 11 | 7 |
| Phase Time (sec) | 17 | 13 |
| Phase Split | 57% | 43% |

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

### Output Phase Sequence




REF: Reference Phase
VAR: Variable Phase



# PHASING SUMMARY

## Site: 10.1 [10.1 U-turn - East of Edgewater Dr (West) (Site Folder: PM)]

## Network: N101 [PM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 30 seconds (Site Practical Cycle Time)

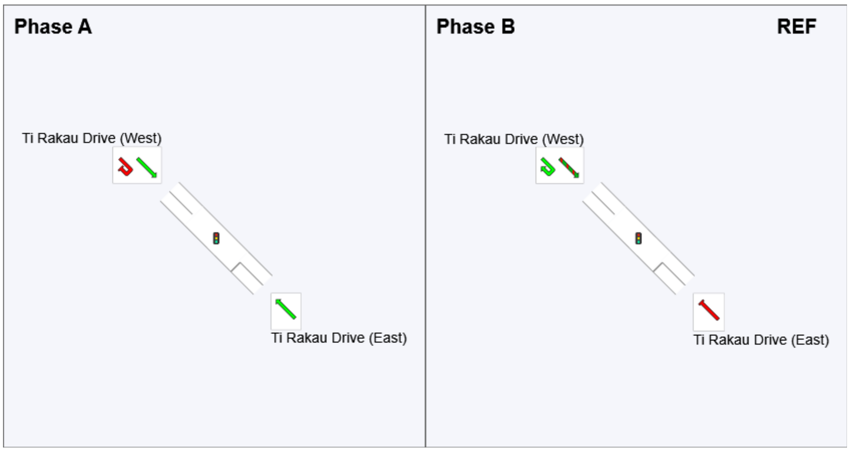
**Timings based on settings in the Site Phasing & Timing dialog**
**Phase Times determined by the program**
**Downstream lane blockage effects included in determining phase times**
**Phase Sequence: Opposed Turns**
**Reference Phase: Phase B**
**Input Phase Sequence: A, B**
**Output Phase Sequence: A, B**

## Phase Timing Summary

| Phase | A | B |
|---|---|---|
| Phase Change Time (sec) | 12 | 0 |
| Green Time (sec) | 12 | 6 |
| Phase Time (sec) | 18 | 12 |
| Phase Split | 60% | 40% |

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

## Output Phase Sequence




REF: Reference Phase
VAR: Variable Phase

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

# PHASING SUMMARY

## Site: 13.0 [13.0 Gossamer Dr / Ti Rakau Dr Closure (Site Folder: PM)]

## Network: N101 [PM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated    Cycle Time = 150 seconds (Site Practical Cycle Time)

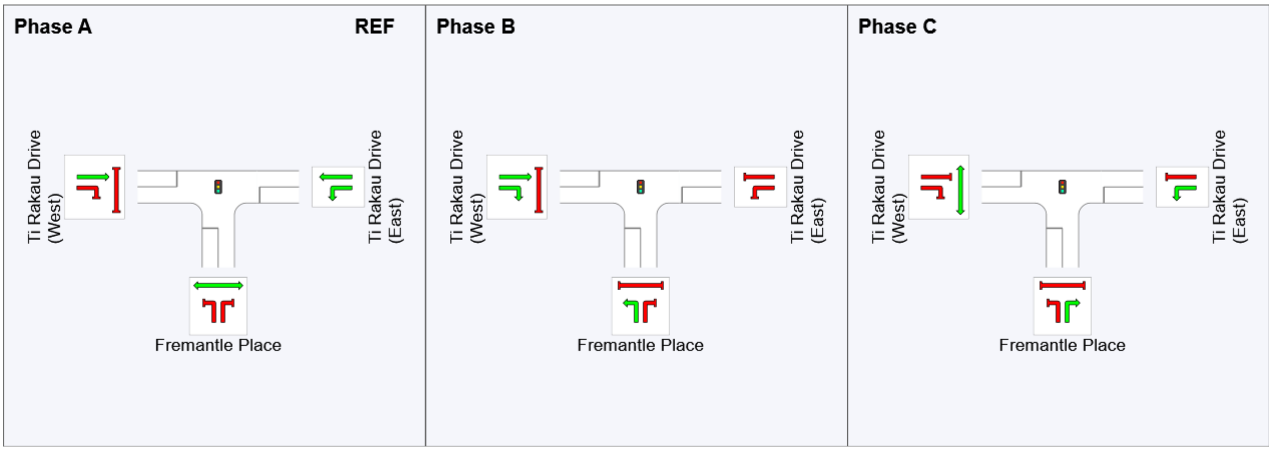
**Timings based on settings in the Site Phasing & Timing dialog**
**Phase Times determined by the program**
**Downstream lane blockage effects included in determining phase times**
**Green Split Priority has been specified**
**Phase Sequence: Variable Phasing**
**Reference Phase: Phase A**
**Input Phase Sequence: A, B, C**
**Output Phase Sequence: A, B, C**

### Phase Timing Summary

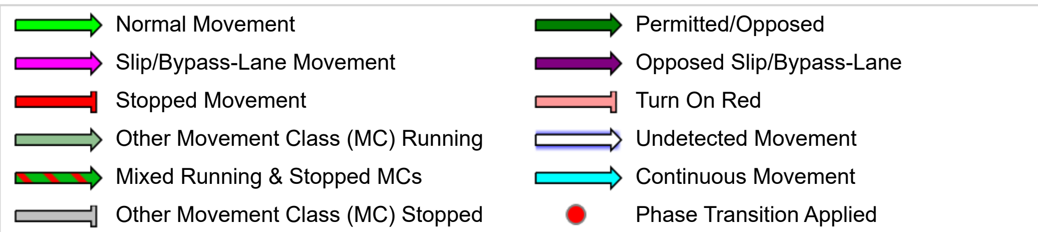
| Phase | A | B | C |
|---|---|---|---|
| Phase Change Time (sec) | 0 | 104 | 135 |
| Green Time (sec) | 98 | 25 | 9 |
| Phase Time (sec) | 104 | 31 | 15 |
| Phase Split | 69% | 21% | 10% |

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

### Output Phase Sequence




REF: Reference Phase
VAR: Variable Phase



# Appendix I

**Construction Scenario 3 – Lane performance Summaries**

# LANE SUMMARY

## Site: 1.0 [1.0 Pakuranga Rd / Ti Rakau Dr (Site Folder: AM)]

## Network: N101 [AM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated    Cycle Time = 110 seconds (Site Practical Cycle Time)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total | HV ] | ARRIVAL FLOWS [ Total | HV ] | Cap. | Deg. Satn | Lane Util. | Aver. Delay | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] | Lane Config | Lane Length | Cap. Adj. | Prob. Block. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | veh/h | % | veh/h | % | veh/h | v/c | % | sec | | | m | | m | % | % |
| **South: Ti Rakau Drive** | | | | | | | | | | | | | | | |
| Lane 1 | 367 | 9.0 | 367 | 9.0 | 896 [1] | 0.410 | 100 | 12.0 | LOS B | 7.2 | 54.2 | Full | 174 | 0.0 | 0.0 |
| Lane 2 (B) | 17 | 100.0 | 17 | 100.0 | 90 | 0.189 | 100 | 59.1 | LOS E | 0.8 | 10.3 | Short | 16 | 0.0 | NA |
| Lane 3 | 34 | 4.4 | 34 | 4.4 | 326 | 0.104 | 100 | 45.3 | LOS D | 1.4 | 10.0 | Full | 174 | 0.0 | 0.0 |
| Lane 4 | 34 | 4.4 | 34 | 4.4 | 326 | 0.104 | 100 | 45.3 | LOS D | 1.4 | 10.0 | Short | 40 | 0.0 | NA |
| Approach | 452 | 11.7 | 452 | 11.7 | | 0.410 | | 18.7 | LOS B | 7.2 | 54.2 | | | | |
| **East: Pakuranga Road (East)** | | | | | | | | | | | | | | | |
| Lane 1 | 275 | 8.0 | 275 | 8.0 | 381 [1] | 0.722 | 100 | 33.6 | LOS C | 10.2 | 76.0 | Short | 21 | 0.0 | NA |
| Lane 2 | 363 | 6.0 | 363 | 6.0 | 452 [1] | 0.803 | 100 | 33.9 | LOS C | 14.9 | 110.0 | Full | 98 | 0.0 | 25.5 |
| Lane 3 | 490 | 10.8 | 490 | 10.8 | 611 | 0.803 | 100 | 39.2 | LOS D | 18.7 [N4] | 143.2 [N4] | Full | 98 | 0.0 | 50.0 |
| Approach | 1128 | 8.6 | 1128 | 8.6 | | 0.803 | | 36.1 | LOS D | 18.7 | 143.2 | | | | |
| **West: Pakuranga Road (West)** | | | | | | | | | | | | | | | |
| Lane 1 (B) | 24 | 100.0 | 24 | 100.0 | 62 | 0.389 | 100 | 61.3 | LOS E | 1.2 | 15.8 | Full | 380 | 0.0 | 0.0 |
| Lane 2 | 209 | 6.9 | 209 | 6.9 | 253 | 0.826 | 100 | 56.6 | LOS E | 10.8 | 80.3 | Full | 380 | 0.0 | 0.0 |
| Lane 3 | 209 | 6.9 | 209 | 6.9 | 253 | 0.826 | 100 | 56.6 | LOS E | 10.8 | 80.3 | Full | 380 | 0.0 | 0.0 |
| Lane 4 | 129 | 15.6 | 129 | 15.6 | 272 | 0.472 | 100 | 50.8 | LOS D | 5.8 | 45.7 | Short | 178 | 0.0 | NA |
| Lane 5 | 129 | 15.6 | 129 | 15.6 | 272 | 0.472 | 100 | 50.8 | LOS D | 5.8 | 45.7 | Short | 105 | 0.0 | NA |
| Approach | 699 | 13.3 | 699 | 13.3 | | 0.826 | | 54.7 | LOS D | 10.8 | 80.3 | | | | |
| Intersection | 2279 | 10.7 | 2279 | 10.7 | | 0.826 | | 38.4 | LOS D | 18.7 | 143.2 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
N4 Average back of queue has been restricted to the available queue storage space.

**Approach Lane Flows (veh/h)**

South: Ti Rakau Drive

| Mov. From S To Exit: | L2 W | R2 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 367 | - | 367 | 9.0 | 896 [1] | 0.410 | 100 | NA | NA |
| Lane 2 | 17 | - | 17 | 100.0 | 90 | 0.189 | 100 | 0.0 | 1 |
| Lane 3 | - | 34 | 34 | 4.4 | 326 | 0.104 | 100 | NA | NA |
| Lane 4 | - | 34 | 34 | 4.4 | 326 | 0.104 | 100 | 0.0 | 3 |
| Approach | 384 | 68 | 452 | 11.7 | | 0.410 | | | |

East: Pakuranga Road (East)

| Mov. | L2 | T1 | Total | %HV | | Deg. | Lane | Prob. | Ov. |
|---|---|---|---|---|---|---|---|---|---|

| From E<br>To Exit: | S | W | | | Cap.<br>veh/h | Satn<br>v/c | Util.<br>% | SL Ov.<br>% | Lane<br>No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 275 | - | 275 | 8.0 | 381[1] | 0.722 | 100 | 100.0 | 2 |
| Lane 2 | - | 363 | 363 | 6.0 | 452[1] | 0.803 | 100 | NA | NA |
| Lane 3 | - | 490 | 490 | 10.8 | 611 | 0.803 | 100 | NA | NA |
| Approach | 275 | 853 | 1128 | 8.6 | | 0.803 | | | |

West: Pakuranga Road (West)

| Mov.<br>From W<br>To Exit: | T1<br><br>E | R2<br><br>S | Total | %HV | Cap.<br>veh/h | Deg.<br>Satn<br>v/c | Lane<br>Util.<br>% | Prob.<br>SL Ov.<br>% | Ov.<br>Lane<br>No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 9 | 15 | 24 | 100.0 | 62 | 0.389 | 100 | NA | NA |
| Lane 2 | 209 | - | 209 | 6.9 | 253 | 0.826 | 100 | NA | NA |
| Lane 3 | 209 | - | 209 | 6.9 | 253 | 0.826 | 100 | NA | NA |
| Lane 4 | - | 129 | 129 | 15.6 | 272 | 0.472 | 100 | 0.0 | 3 |
| Lane 5 | - | 129 | 129 | 15.6 | 272 | 0.472 | 100 | 0.0 | 4 |
| Approach | 427 | 272 | 699 | 13.3 | | 0.826 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 2279 | 10.7 | 0.826 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

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

**Merge Analysis**

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South Exit: Ti Rakau Drive<br>Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | |
| East Exit: Pakuranga Road (East)<br>Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | |
| West Exit: Pakuranga Road (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | |

# LANE SUMMARY

## Site: 2.1 [2.1 Pakuranga Plaza / Pakuranga Rd (Site Folder: AM)]

## Network: N101 [AM (Network Folder: General)]

Site Category: (None)
Give-Way (Two-Way)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Pakuranga Road (East) | | | | | | | | | | | | | | | |
| Lane 1 | 592 | 9.8 | 592 | 9.8 | 1813 | 0.327 | 100 | 0.9 | LOS A | 0.0 | 0.0 | Full | 121 | 0.0 | 0.0 |
| Lane 2 | 609 | 6.3 | 609 | 6.3 | 1864 | 0.327 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 121 | 0.0 | 0.0 |
| Approach | 1201 | 8.0 | 1201 | 8.0 | | 0.327 | | 0.5 | NA | 0.0 | 0.0 | | | | |
| West: Pakuranga Road (West) | | | | | | | | | | | | | | | |
| Lane 1 | 253 | 8.1 | 253 | 8.1 | 1843 | 0.137 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 108 | 0.0 | 0.0 |
| Lane 2 | 253 | 8.1 | 253 | 8.1 | 1843 | 0.137 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 108 | 0.0 | 0.0 |
| Approach | 506 | 8.1 | 506 | 8.1 | | 0.137 | | 0.0 | NA | 0.0 | 0.0 | | | | |
| SouthWest: Pakuranga Plaza | | | | | | | | | | | | | | | |
| Lane 1 | 27 | 3.7 | 27 | 3.7 | 822 | 0.033 | 100 | 2.5 | LOS A | 0.1 | 0.7 | Full | 196 | 0.0 | 0.0 |
| Approach | 27 | 3.7 | 27 | 3.7 | | 0.033 | | 2.5 | LOS A | 0.1 | 0.7 | | | | |
| Intersection | 1734 | 8.0 | 1734 | 8.0 | | 0.327 | | 0.4 | NA | 0.1 | 0.7 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

**Approach Lane Flows (veh/h)**

East: Pakuranga Road (East)

| Mov. From E To Exit: | L1 SW | T1 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 102 | 490 | 592 | 9.8 | 1813 | 0.327 | 100 | NA | NA |
| Lane 2 | - | 609 | 609 | 6.3 | 1864 | 0.327 | 100 | NA | NA |
| Approach | 102 | 1099 | 1201 | 8.0 | | 0.327 | | | |

West: Pakuranga Road (West)

| Mov. From W To Exit: | T1 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|
| Lane 1 | 253 | 253 | 8.1 | 1843 | 0.137 | 100 | NA | NA |
| Lane 2 | 253 | 253 | 8.1 | 1843 | 0.137 | 100 | NA | NA |
| Approach | 506 | 506 | 8.1 | | 0.137 | | | |

SouthWest: Pakuranga Plaza

| Mov. From SW To Exit: | L3 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|
| Lane 1 | 27 | 27 | 3.7 | 822 | 0.033 | 100 | NA | NA |

| | | | | |
|---|---|---|---|---|
| Approach | 27 | 27 | 3.7 | 0.033 |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 1734 | 8.0 | 0.327 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

| Merge Analysis | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| East Exit: Pakuranga Road (East)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| West Exit: Pakuranga Road (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| SouthWest Exit: Pakuranga Plaza<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |

# LANE SUMMARY

## Site: 3.0 [3.0 Pakuranga Highway / Pakuranga Rd (Site Folder: AM)]

## Network: N101 [AM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated    Cycle Time = 60 seconds (Site Practical Cycle Time)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Pakuranga Road (East) | | | | | | | | | | | | | | | |
| Lane 1 | 598 | 5.5 | 598 | 5.5 | 671 | 0.890 | 100 | 34.8 | LOS C | 19.5 | 142.9 | Full | 183 | 0.0 | 0.0 |
| Lane 2 | 598 | 5.5 | 598 | 5.5 | 671 | 0.890 | 100 | 34.8 | LOS C | 19.5 | 142.9 | Full | 183 | 0.0 | 0.0 |
| Lane 3 | 453 | 8.1 | 453 | 8.1 | 660 | 0.685 | 100 | 21.9 | LOS C | 10.5 | 78.7 | Full | 183 | 0.0 | 0.0 |
| Lane 4 | 453 | 8.1 | 453 | 8.1 | 660 | 0.685 | 100 | 21.9 | LOS C | 10.5 | 78.7 | Short | 60 | 0.0 | NA |
| Approach | 2100 | 6.6 | 2100 | 6.6 | | 0.890 | | 29.3 | LOS C | 19.5 | 142.9 | | | | |
| NorthWest: Pakuranga Road (West) | | | | | | | | | | | | | | | |
| Lane 1 | 188 | 10.9 | 188 | 10.9 | 648 | 0.290 | 100 | 18.2 | LOS B | 3.6 | 27.2 | Full | 121 | 0.0 | 0.0 |
| Lane 2 | 193 | 6.5 | 193 | 6.5 | 667 | 0.290 | 100 | 18.2 | LOS B | 3.7 | 27.0 | Full | 121 | 0.0 | 0.0 |
| Lane 3 | 130 | 5.4 | 130 | 5.4 | 356 | 0.365 | 100 | 27.9 | LOS C | 3.1 | 22.5 | Short | 98 | 0.0 | NA |
| Approach | 511 | 7.8 | 511 | 7.8 | | 0.365 | | 20.7 | LOS C | 3.7 | 27.2 | | | | |
| SouthWest: Flyover | | | | | | | | | | | | | | | |
| Lane 1 | 304 | 7.9 | 304 | 7.9 | 361 | 0.843 | 100 | 37.7 | LOS D | 9.2 | 68.8 | Short | 70 | 0.0 | NA |
| Lane 2 | 215 | 6.5 | 215 | 6.5 | 250 | 0.858 | 100 | 39.7 | LOS D | 6.6 | 49.1 | Full | 1162 | 0.0 | 0.0 |
| Lane 3 | 215 | 6.5 | 215 | 6.5 | 250 | 0.858 | 100 | 39.7 | LOS D | 6.6 | 49.1 | Full | 1162 | 0.0 | 0.0 |
| Approach | 733 | 7.1 | 733 | 7.1 | | 0.858 | | 38.9 | LOS D | 9.2 | 68.8 | | | | |
| Intersection | 3344 | 6.9 | 3344 | 6.9 | | 0.890 | | 30.1 | LOS C | 19.5 | 142.9 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

**Approach Lane Flows (veh/h)**

East: Pakuranga Road (East)

| Mov. From E To Exit: | L1 SW | R1 NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 598 | - | 598 | 5.5 | 671 | 0.890 | 100 | NA | NA |
| Lane 2 | 598 | - | 598 | 5.5 | 671 | 0.890 | 100 | NA | NA |
| Lane 3 | - | 453 | 453 | 8.1 | 660 | 0.685 | 100 | NA | NA |
| Lane 4 | - | 453 | 453 | 8.1 | 660 | 0.685 | 100 | 39.9 | 3 |
| Approach | 1195 | 905 | 2100 | 6.6 | | 0.890 | | | |

NorthWest: Pakuranga Road (West)

| Mov. From NW To Exit: | L1 E | R2 SW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 188 | - | 188 | 10.9 | 648 | 0.290 | 100 | NA | NA |
| Lane 2 | 193 | - | 193 | 6.5 | 667 | 0.290 | 100 | NA | NA |
| Lane 3 | - | 130 | 130 | 5.4 | 356 | 0.365 | 100 | 0.0 | 2 |

| Mov. From SW To Exit: | L2 NW | R1 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Approach | 381 | 130 | 511 | 7.8 | | 0.365 | | | |
| SouthWest: Flyover | | | | | | | | | |
| Lane 1 | 304 | - | 304 | 7.9 | 361 | 0.843 | 100 | 13.4 | 2 |
| Lane 2 | - | 215 | 215 | 6.5 | 250 | 0.858 | 100 | NA | NA |
| Lane 3 | - | 215 | 215 | 6.5 | 250 | 0.858 | 100 | NA | NA |
| Approach | 304 | 429 | 733 | 7.1 | | 0.858 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 3344 | 6.9 | 0.890 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

## Merge Analysis

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| East Exit: Pakuranga Road (East) Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | | |
| NorthWest Exit: Pakuranga Road (West) Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| SouthWest Exit: Flyover Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |

# LANE SUMMARY

## Site: 4.0 [4.0 Palm Ave / Aylesbury St (Site Folder: AM)]

## Network: N101 [AM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated    Cycle Time = 70 seconds (Site Practical Cycle Time)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Ti Rakau Drive (East) | | | | | | | | | | | | | | | |
| Lane 1 | 196 | 11.5 | 196 | 11.5 | 303 | 0.647 | 100 | 31.6 | LOS C | 6.0 | 46.0 | Full | 110 | 0.0 | 0.0 |
| Lane 2 | 199 | 11.8 | 199 | 11.8 | 307 | 0.647 | 100 | 31.7 | LOS C | 6.1 | 46.7 | Short | 80 | 0.0 | NA |
| Approach | 395 | 11.6 | 395 | 11.6 | | 0.647 | | 31.7 | LOS C | 6.1 | 46.7 | | | | |
| East: Aylesbury Street | | | | | | | | | | | | | | | |
| Lane 1 | 26 | 3.8 | 26 | 3.8 | 150 | 0.173 | 100 | 36.3 | LOS D | 0.8 | 5.7 | Short | 30 | 0.0 | NA |
| Lane 2 | 43 | 9.3 | 43 | 9.3 | 149 | 0.288 | 100 | 36.5 | LOS D | 1.3 | 10.1 | Full | 40 | 0.0 | 0.0 |
| Approach | 69 | 7.2 | 69 | 7.2 | | 0.288 | | 36.4 | LOS D | 1.3 | 10.1 | | | | |
| North: Ti Rakau Drive (West) | | | | | | | | | | | | | | | |
| Lane 1 | 151 | 13.8 | 151 | 13.8 | 555 | 0.272 | 39[6] | 20.6 | LOS C | 3.5 | 27.6 | Full | 174 | 0.0 | 0.0 |
| Lane 2 | 390 | 14.4 | 390 | 14.4 | 565 | 0.690 | 100 | 24.1 | LOS C | 10.9 | 85.9 | Full | 174 | 0.0 | 0.0 |
| Approach | 541 | 14.2 | 541 | 14.2 | | 0.690 | | 23.1 | LOS C | 10.9 | 85.9 | | | | |
| West: Palm Avenue | | | | | | | | | | | | | | | |
| Lane 1 | 92 | 3.3 | 92 | 3.3 | 158 | 0.582 | 100 | 40.7 | LOS D | 3.0 | 21.3 | Full | 87 | 0.0 | 0.0 |
| Approach | 92 | 3.3 | 92 | 3.3 | | 0.582 | | 40.7 | LOS D | 3.0 | 21.3 | | | | |
| Intersection | 1097 | 11.9 | 1097 | 11.9 | | 0.690 | | 28.5 | LOS C | 10.9 | 85.9 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

6 Lane under-utilisation due to downstream effects

**Approach Lane Flows (veh/h)**

South: Ti Rakau Drive (East)

| Mov. From S To Exit: | L2 W | T1 N | R2 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 19 | 177 | - | 196 | 11.5 | 303 | 0.647 | 100 | NA | NA |
| Lane 2 | - | 177 | 22 | 199 | 11.8 | 307 | 0.647 | 100 | 0.0 | 1 |
| Approach | 19 | 354 | 22 | 395 | 11.6 | | 0.647 | | | |

East: Aylesbury Street

| Mov. From E To Exit: | L2 S | T1 W | R2 N | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 26 | - | - | 26 | 3.8 | 150 | 0.173 | 100 | 0.0 | 2 |
| Lane 2 | - | 10 | 33 | 43 | 9.3 | 149 | 0.288 | 100 | NA | NA |
| Approach | 26 | 10 | 33 | 69 | 7.2 | | 0.288 | | | |

North: Ti Rakau Drive (West)

| Mov. From N To Exit: | L2 E | T1 S | R2 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 26 | 125 | - | 151 | 13.8 | 555 | 0.272 | 39[6] | NA | NA |
| Lane 2 | - | 374 | 16 | 390 | 14.4 | 565 | 0.690 | 100 | NA | NA |
| Approach | 26 | 499 | 16 | 541 | 14.2 | | 0.690 | | | |
| West: Palm Avenue | | | | | | | | | | |
| Mov. From W To Exit: | L2 N | T1 E | R2 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 58 | 10 | 24 | 92 | 3.3 | 158 | 0.582 | 100 | NA | NA |
| Approach | 58 | 10 | 24 | 92 | 3.3 | | 0.582 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 1097 | 11.9 | 0.690 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

6 Lane under-utilisation due to downstream effects

**Merge Analysis**

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | Opposing Flow Rate pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South Exit: Ti Rakau Drive (East)<br>Merge Type: **Zipper** | | | | | | | | | | | | |
| Exit Short Lane | 1 | 70 | 50.0 | 199 | 213 | 2.50 | 2.00 | 151 | 1546 | 0.098 | 0.0 | 0.1 |
| Merge Lane | 2 | - | 50.0 | 75 | 80 | 2.50 | 2.00 | 398 | 1709 | 0.233 | 0.0 | 0.0 |
| East Exit: Aylesbury Street<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| North Exit: Ti Rakau Drive (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| West Exit: Palm Avenue<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |

# LANE SUMMARY

## Site: 5.0 [5.0 Pakuranga Highway/ Reeves Rd (Site Folder: AM)]

## Network: N101 [AM (Network Folder: General)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated    Cycle Time = 50 seconds (Site Practical Cycle Time)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SouthEast: Ti Rakau Drive (East)** | | | | | | | | | | | | | | | |
| Lane 1 | 895 | 9.1 | 895 | 9.1 | 1007 | 0.889 | 100 | 26.9 | LOS C | 17.4 N4 | 131.5 N4 | Full | 90 | 0.0 | 50.0 |
| Lane 2 | 379 | 12.4 | 379 | 12.4 | 1041 | 0.364 | 100 | 6.1 | LOS A | 4.5 | 34.6 | Full | 90 | 0.0 | 0.0 |
| Approach | 1274 | 10.0 | 1274 | 10.0 | | 0.889 | | 20.7 | LOS C | 17.4 | 131.5 | | | | |
| **NorthWest: Ti Rakau Drive (West)** | | | | | | | | | | | | | | | |
| Lane 1 | 552 | 14.3 | 552 | 14.3 | 1046 | 0.528 | 100 | 6.9 | LOS A | 7.4 | 58.3 | Full | 110 | 0.0 | 0.0 |
| Approach | 552 | 14.3 | 552 | 14.3 | | 0.528 | | 6.9 | LOS A | 7.4 | 58.3 | | | | |
| **SouthWest: Pakuranga HWY** | | | | | | | | | | | | | | | |
| Lane 1 | 26 | 3.8 | 26 | 3.8 | 324 | 0.080 | 100 | 26.5 | LOS C | 0.5 | 3.6 | Full | 623 | 0.0 | 0.0 |
| Approach | 26 | 3.8 | 26 | 3.8 | | 0.080 | | 26.5 | LOS C | 0.5 | 3.6 | | | | |
| Intersection | 1852 | 11.2 | 1852 | 11.2 | | 0.889 | | 16.7 | LOS B | 17.4 | 131.5 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N4 Average back of queue has been restricted to the available queue storage space.

**Approach Lane Flows (veh/h)**

SouthEast: Ti Rakau Drive (East)

| Mov. From SE To Exit: | L2 SW | T1 NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 895 | - | 895 | 9.1 | 1007 | 0.889 | 100 | NA | NA |
| Lane 2 | - | 379 | 379 | 12.4 | 1041 | 0.364 | 100 | NA | NA |
| Approach | 895 | 379 | 1274 | 10.0 | | 0.889 | | | |

NorthWest: Ti Rakau Drive (West)

| Mov. From NW To Exit: | T1 SE | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|
| Lane 1 | 552 | 552 | 14.3 | 1046 | 0.528 | 100 | NA | NA |
| Approach | 552 | 552 | 14.3 | | 0.528 | | | |

SouthWest: Pakuranga HWY

| Mov. From SW To Exit: | L2 NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|
| Lane 1 | 26 | 26 | 3.8 | 324 | 0.080 | 100 | NA | NA |
| Approach | 26 | 26 | 3.8 | | 0.080 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|

| | | | |
|---|---|---|---|
| Intersection | 1852 | 11.2 | 0.889 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

## Merge Analysis

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | Opposing Flow Rate pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast Exit: Ti Rakau Drive (East)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| NorthWest Exit: Ti Rakau Drive (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| SouthWest Exit: Pakuranga HWY<br>Merge Type: **Priority** | | | | | | | | | | | | |
| Exit Short Lane | 2 | 10 | 0.0 | 895 | 935 | 3.00 | 2.00 | 0 | 824 | 0.000 | 2.3 | 2.3 |
| Merge Lane | 1 | - | 100.0 | Merge Lane is not Opposed | | | | 895 | 1800 | 0.497 | 0.0 | 0.0 |

# LANE SUMMARY

**Site: 7.1 [7.1 William Roberts Rd / Cortina Pl (Site Folder: AM)]**

**Network: N101 [AM (Network Folder: General)]**

Site Category: (None)
Give-Way (Two-Way)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NorthEast: William Roberts Road (North) | | | | | | | | | | | | | | | |
| Lane 1 | 131 | 4.6 | 131 | 4.6 | 1860 | 0.070 | 100 | 0.2 | LOS A | 0.1 | 0.5 | Full | 223 | 0.0 | 0.0 |
| Approach | 131 | 4.6 | 131 | 4.6 | | 0.070 | | 0.2 | NA | 0.1 | 0.5 | | | | |
| NorthWest: Cortina Place | | | | | | | | | | | | | | | |
| Lane 1 | 37 | 5.4 | 37 | 5.4 | 1249 | 0.030 | 100 | 2.7 | LOS A | 0.1 | 0.6 | Full | 177 | 0.0 | 0.0 |
| Approach | 37 | 5.4 | 37 | 5.4 | | 0.030 | | 2.7 | LOS A | 0.1 | 0.6 | | | | |
| SouthWest: William Roberts Road (South) | | | | | | | | | | | | | | | |
| Lane 1 | 87 | 6.9 | 87 | 6.9 | 1793 | 0.049 | 100 | 0.5 | LOS A | 0.0 | 0.0 | Full | 110 | 0.0 | 0.0 |
| Approach | 87 | 6.9 | 87 | 6.9 | | 0.049 | | 0.5 | NA | 0.0 | 0.0 | | | | |
| Intersection | 255 | 5.5 | 255 | 5.5 | | 0.070 | | 0.7 | NA | 0.1 | 0.6 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

**Approach Lane Flows (veh/h)**

NorthEast: William Roberts Road (North)

| Mov. From NE To Exit: | T1 SW | R2 NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 121 | 10 | 131 | 4.6 | 1860 | 0.070 | 100 | NA | NA |
| Approach | 121 | 10 | 131 | 4.6 | | 0.070 | | | |

NorthWest: Cortina Place

| Mov. From NW To Exit: | L2 NE | R2 SW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 19 | 18 | 37 | 5.4 | 1249 | 0.030 | 100 | NA | NA |
| Approach | 19 | 18 | 37 | 5.4 | | 0.030 | | | |

SouthWest: William Roberts Road (South)

| Mov. From SW To Exit: | L2 NW | T1 NE | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 23 | 64 | 87 | 6.9 | 1793 | 0.049 | 100 | NA | NA |
| Approach | 23 | 64 | 87 | 6.9 | | 0.049 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|

| | | | |
|---|---|---|---|
| Intersection | 255 | 5.5 | 0.070 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

| Merge Analysis | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | Opposing Flow Rate pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NorthEast Exit: William Roberts Road (North)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| NorthWest Exit: Cortina Place<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| SouthWest Exit: William Roberts Road (South)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |

# LANE SUMMARY

## Site: 8.1 [8.1 U-turn - West of Marriot Rd (Site Folder: AM)]

## Network: N101 [AM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated    Cycle Time = 30 seconds (Site Practical Cycle Time)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SouthEast: Ti Rakau Drive (East)** | | | | | | | | | | | | | | | |
| Lane 1 | 594 | 9.2 | 593 | 9.2 | 1831 | 0.324 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 147 | 0.0 | 0.0 |
| Lane 2 | 594 | 9.2 | 593 | 9.2 | 1831 | 0.324 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 147 | 0.0 | 0.0 |
| Lane 3 | 110 | 5.5 | 110 | 5.5 | 268 | 0.411 | 100 | 18.7 | LOS B | 1.4 | 10.3 | Short | 14 | 0.0 | NA |
| Lane 4 (B) | 17 | 100.0 | 17 | 100.0 | 478 | 0.036 | 100 | 2.1 | LOS A | 0.0 | 0.6 | Full | 147 | 0.0 | 0.0 |
| Approach | 1314 | 10.0 | 1314 | 10.0 | | 0.411 | | 1.6 | LOS A | 1.4 | 10.3 | | | | |
| **NorthWest: Ti Rakau Drive (West)** | | | | | | | | | | | | | | | |
| Lane 1 | 308 | 10.7 | 308 | 10.7 | 725 | 0.425 | 100 | 7.4 | LOS A | 3.1 | 23.5 | Full | 73 | 0.0 | 0.0 |
| Lane 2 | 308 | 10.7 | 308 | 10.7 | 725 | 0.425 | 100 | 7.4 | LOS A | 3.1 | 23.5 | Full | 73 | 0.0 | 0.0 |
| Lane 3 (B) | 13 | 100.0 | 13 | 100.0 | 478 | 0.027 | 100 | 2.1 | LOS A | 0.0 | 0.5 | Full | 73 | 0.0 | 0.0 |
| Approach | 629 | 12.6 | 629 | 12.6 | | 0.425 | | 7.3 | LOS A | 3.1 | 23.5 | | | | |
| Intersection | 1943 | 10.9 | 1943 | 10.9 | | 0.425 | | 3.5 | LOS A | 3.1 | 23.5 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

**Approach Lane Flows (veh/h)**

SouthEast: Ti Rakau Drive (East)

| Mov. From SE To Exit: | T1 NW | U SE | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 593 | - | 593 | 9.2 | 1831 | 0.324 | 100 | NA | NA |
| Lane 2 | 593 | - | 593 | 9.2 | 1831 | 0.324 | 100 | NA | NA |
| Lane 3 | - | 110 | 110 | 5.5 | 268 | 0.411 | 100 | 0.0 | 2 |
| Lane 4 | 17 | - | 17 | 100.0 | 478 | 0.036 | 100 | NA | NA |
| Approach | 1204 | 110 | 1314 | 10.0 | | 0.411 | | | |

NorthWest: Ti Rakau Drive (West)

| Mov. From NW To Exit: | T1 SE | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|
| Lane 1 | 308 | 308 | 10.7 | 725 | 0.425 | 100 | NA | NA |
| Lane 2 | 308 | 308 | 10.7 | 725 | 0.425 | 100 | NA | NA |
| Lane 3 | 13 | 13 | 100.0 | 478 | 0.027 | 100 | NA | NA |
| Approach | 629 | 629 | 12.6 | | 0.425 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 1943 | 10.9 | 0.425 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

| Merge Analysis | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast Exit: Ti Rakau Drive (East)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | | |
| NorthWest Exit: Ti Rakau Drive (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | | |

# LANE SUMMARY

## Site: 10.1 [10.1 U-turn - East of Edgewater Dr (West) (Site Folder: AM)]

## Network: N101 [AM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 30 seconds (Site Practical Cycle Time)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast: Ti Rakau Drive (East) | | | | | | | | | | | | | | | |
| Lane 1 | 580 | 8.8 | 580 | 8.8 | 734 | 0.790 | 100 | 12.4 | LOS B | 8.4 | 63.0 | Full | 64 | 0.0 | 13.6 |
| Lane 2 | 580 | 8.8 | 580 | 8.8 | 734 | 0.790 | 100 | 12.4 | LOS B | 8.4 | 63.0 | Full | 64 | 0.0 | 13.6 |
| Lane 3 (B) | 17 | 100.0 | 17 | 100.0 | 478 | 0.036 | 100 | 2.1 | LOS A | 0.0 | 0.6 | Full | 64 | 0.0 | 0.0 |
| Approach | 1176 | 10.1 | 1176 | 10.1 | | 0.790 | | 12.2 | LOS B | 8.4 | 63.0 | | | | |
| NorthWest: Ti Rakau Drive (West) | | | | | | | | | | | | | | | |
| Lane 1 | 623 | 9.2 | 569 | 9.3 | 1829 | 0.311 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 81 | 0.0 | 0.0 |
| Lane 2 | 623 | 9.2 | 569 | 9.3 | 1829 | 0.311 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 81 | 0.0 | 0.0 |
| Lane 3 | 109 | 7.3 | 100 | 7.4 | 264 | 0.377 | 100 | 18.6 | LOS B | 1.3 | 9.4 | Short | 15 | 0.0 | NA |
| Lane 4 (B) | 13 | 100.0 | 13 | 100.0 | 478 | 0.027 | 100 | 2.1 | LOS A | 0.0 | 0.5 | Full | 81 | 0.0 | 0.0 |
| Approach | 1367 | 9.9 | 1251 N1 | 10.1 | | 0.377 | | 1.5 | LOS A | 1.3 | 9.4 | | | | |
| Intersection | 2543 | 10.0 | 2427 N1 | 10.5 | | 0.790 | | 6.7 | LOS A | 8.4 | 63.0 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

**Approach Lane Flows (veh/h)**

SouthEast: Ti Rakau Drive (East)

| Mov. From SE To Exit: | T1 NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|
| Lane 1 | 580 | 580 | 8.8 | 734 | 0.790 | 100 | NA | NA |
| Lane 2 | 580 | 580 | 8.8 | 734 | 0.790 | 100 | NA | NA |
| Lane 3 | 17 | 17 | 100.0 | 478 | 0.036 | 100 | NA | NA |
| Approach | 1176 | 1176 | 10.1 | | 0.790 | | | |

NorthWest: Ti Rakau Drive (West)

| Mov. From NW To Exit: | T1 SE | U NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 569 | - | 569 | 9.3 | 1829 | 0.311 | 100 | NA | NA |
| Lane 2 | 569 | - | 569 | 9.3 | 1829 | 0.311 | 100 | NA | NA |
| Lane 3 | - | 100 | 100 | 7.4 | 264 | 0.377 | 100 | 0.0 | 2 |
| Lane 4 | 13 | - | 13 | 100.0 | 478 | 0.027 | 100 | NA | NA |
| Approach | 1151 | 100 | 1251 | 10.1 | | 0.377 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 2427 | 10.5 | 0.790 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

**Merge Analysis**

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast Exit: Ti Rakau Drive (East)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | | |
| NorthWest Exit: Ti Rakau Drive (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | | |

# LANE SUMMARY

## Site: 13.0 [13.0 Gossamer Dr / Ti Rakau Dr Closure (Site Folder: AM)]

## Network: N101 [AM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated    Cycle Time = 150 seconds (Site Practical Cycle Time)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total | HV ] | ARRIVAL FLOWS [ Total | HV ] | Cap. | Deg. Satn | Lane Util. | Aver. Delay | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] | Lane Config | Lane Length | Cap. Adj. | Prob. Block. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | veh/h | % | veh/h | % | veh/h | v/c | % | sec | | | m | | m | % | % |
| **South: Fremantle Place** | | | | | | | | | | | | | | | |
| Lane 1 | 23 | 0.0 | 23 | 0.0 | 299 | 0.077 | 100 | 62.0 | LOS E | 1.3 | 8.9 | Short | 26 | 0.0 | NA |
| Lane 2 | 12 | 8.3 | 12 | 8.3 | 106 | 0.113 | 100 | 79.1 | LOS E | 0.8 | 5.8 | Full | 285 | 0.0 | 0.0 |
| Approach | 35 | 2.9 | 35 | 2.9 | | 0.113 | | 67.9 | LOS E | 1.3 | 8.9 | | | | |
| **East: Ti Rakau Drive (East)** | | | | | | | | | | | | | | | |
| Lane 1 | 1135 | 10.3 | 1135 | 10.3 | 1199 | 0.946 | 100 | 40.2 | LOS D | 72.9 | 555.2 | Full | 636 | 0.0 | 2.7 |
| Approach | 1135 | 10.3 | 1135 | 10.3 | | 0.946 | | 40.2 | LOS D | 72.9 | 555.2 | | | | |
| **West: Ti Rakau Drive (West)** | | | | | | | | | | | | | | | |
| Lane 1 | 1214 | 10.2 | 1201 | 10.2 | 1317 | 0.912 | 100 | 21.8 | LOS C | 66.0 | 502.2 | Full | 479 | 0.0 | 19.3 |
| Approach | 1214 | 10.2 | 1201 N1 | 10.2 | | 0.912 | | 21.8 | LOS C | 66.0 | 502.2 | | | | |
| Intersection | 2384 | 10.2 | 2371 N1 | 10.2 | | 0.946 | | 31.3 | LOS C | 72.9 | 555.2 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

**Approach Lane Flows (veh/h)**

**South: Fremantle Place**

| Mov. From S To Exit: | L2 W | R2 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 23 | - | 23 | 0.0 | 299 | 0.077 | 100 | 0.0 | 2 |
| Lane 2 | - | 12 | 12 | 8.3 | 106 | 0.113 | 100 | NA | NA |
| Approach | 23 | 12 | 35 | 2.9 | | 0.113 | | | |

**East: Ti Rakau Drive (East)**

| Mov. From E To Exit: | L2 S | T1 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 10 | 1125 | 1135 | 10.3 | 1199 | 0.946 | 100 | NA | NA |
| Approach | 10 | 1125 | 1135 | 10.3 | | 0.946 | | | |

**West: Ti Rakau Drive (West)**

| Mov. From W To Exit: | T1 E | R2 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 1191 | 10 | 1201 | 10.2 | 1317 | 0.912 | 100 | NA | NA |
| Approach | 1191 | 10 | 1201 | 10.2 | | 0.912 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 2371 | 10.2 | 0.946 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

**Merge Analysis**

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South Exit: Fremantle Place<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| East Exit: Ti Rakau Drive (East)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| West Exit: Ti Rakau Drive (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |

# CCG LANE SUMMARY

## Common Control Group: CCG2 [WRR / Mattson]

**Network: N101 [AM (Network Folder: General)]**

EQUISAT (Fixed-Time/SCATS) Isolated    Cycle Time = 50 seconds (CCG Practical Cycle Time)

**Lane Use and Performance (CCG)**

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site: 7.0 [7.0 William Roberts Rd / Ti Rakau Dr] | | | | | | | | | | | | | | | |
| SouthEast: Ti Rakau Drive (East) | | | | | | | | | | | | | | | |
| Lane 1 | 383 | 9.1 | 383 | 9.1 | 696 | 0.551 | 100 | 11.9 | LOS B | 5.8 | 43.6 | Full | 60 | 0.0 | 0.0 |
| Lane 2 | 383 | 9.1 | 383 | 9.1 | 696 | 0.551 | 100 | 2.6 | LOS A | 2.0 | 15.2 | Full | 60 | 0.0 | 0.0 |
| Lane 3 | 383 | 9.1 | 383 | 9.1 | 696 | 0.551 | 100 | 2.6 | LOS A | 2.0 | 15.2 | Full | 60 | 0.0 | 0.0 |
| Lane 4 | 61 | 4.9 | 61 | 4.9 | 250 | 0.244 | 100 | 29.4 | LOS C | 1.4 | 10.3 | Short | 20 | 0.0 | NA |
| Lane 5 (B) | 17 | 100.0 | 17 | 100.0 | 454 | 0.037 | 100 | 4.2 | LOS A | 0.1 | 1.2 | Full | 60 | 0.0 | 0.0 |
| Approach | 1228 | 10.2 | 1228 | 10.2 | | 0.551 | | 6.9 | LOS A | 5.8 | 43.6 | | | | |
| NorthEast: William Roberts Road Extension | | | | | | | | | | | | | | | |
| Lane 1 | 86 | 3.5 | 86 | 3.5 | 252 | 0.341 | 100 | 24.4 | LOS C | 1.8 | 13.2 | Short | 80 | 0.0 | NA |
| Lane 2 | 53 | 7.5 | 53 | 7.5 | 210 | 0.252 | 100 | 25.0 | LOS C | 1.1 | 8.5 | Full | 110 | 0.0 | 0.0 |
| Approach | 139 | 5.0 | 139 | 5.0 | | 0.341 | | 24.7 | LOS C | 1.8 | 13.2 | | | | |
| NorthWest: Ti Rakau Drive (West) | | | | | | | | | | | | | | | |
| Lane 1 | 109 | 12.5 | 109 | 12.5 | 341 | 0.319 | 100 | 23.1 | LOS C | 2.2 | 17.2 | Full | 107 | 0.0 | 0.0 |
| Lane 2 | 217 | 12.8 | 217 | 12.8 | 681 | 0.319 | 100 | 12.1 | LOS B | 3.4 | 26.7 | Full | 107 | 0.0 | 0.0 |
| Lane 3 | 217 | 12.8 | 217 | 12.8 | 681 | 0.319 | 100 | 12.1 | LOS B | 3.4 | 26.7 | Full | 107 | 0.0 | 0.0 |
| Lane 4 (B) | 13 | 100.0 | 13 | 100.0 | 454 | 0.029 | 100 | 4.1 | LOS A | 0.1 | 0.9 | Full | 107 | 0.0 | 0.0 |
| Approach | 556 | 14.7 | 556 | 14.7 | | 0.319 | | 14.1 | LOS B | 3.4 | 26.7 | | | | |
| Intersection | 1923 | 11.1 | 1923 | 11.1 | | 0.551 | | 10.2 | LOS B | 5.8 | 43.6 | | | | |
| Site: 7.5 [7.5 Mattson Rd/ Ti Rakau Dr] | | | | | | | | | | | | | | | |
| SouthEast: Ti Rakau Drive (East) | | | | | | | | | | | | | | | |
| Lane 1 | 256 | 9.0 | 256 | 9.0 | 332 | 0.771 | 100 | 32.9 | LOS C | 6.8 | 51.1 | Short | 25 | 0.0 | NA |
| Lane 2 | 405 | 9.0 | 405 | 9.0 | 525 [1] | 0.771 | 100 | 17.4 | LOS B | 8.3 | 62.7 | Full | 143 | 0.0 | 0.0 |
| Lane 3 | 537 | 9.0 | 537 | 9.0 | 696 | 0.771 | 100 | 17.9 | LOS B | 11.7 | 88.5 | Full | 143 | 0.0 | 0.0 |
| Lane 4 (B) | 17 | 100.0 | 17 | 100.0 | 447 | 0.038 | 100 | 4.2 | LOS A | 0.1 | 1.2 | Full | 143 | 0.0 | 0.0 |
| Approach | 1215 | 10.3 | 1215 | 10.3 | | 0.771 | | 20.7 | LOS C | 11.7 | 88.5 | | | | |
| NorthWest: Ti Rakau Drive (West) | | | | | | | | | | | | | | | |
| Lane 1 | 70 | 11.2 | 70 | 11.2 | 687 | 0.101 | 27 [6] | 11.5 | LOS B | 1.1 | 8.2 | Full | 60 | 0.0 | 0.0 |
| Lane 2 | 256 | 11.2 | 256 | 11.2 | 687 | 0.372 | 100 | 6.7 | LOS A | 2.6 | 19.6 | Full | 60 | 0.0 | 0.0 |
| Lane 3 | 256 | 11.2 | 256 | 11.2 | 687 | 0.372 | 100 | 2.4 | LOS A | 1.0 | 7.9 | Full | 60 | 0.0 | 0.0 |
| Lane 4 | 16 | 18.8 | 16 | 18.8 | 228 | 0.070 | 100 | 28.5 | LOS C | 0.4 | 3.0 | Short | 25 | 0.0 | NA |
| Lane 5 (B) | 13 | 100.0 | 13 | 100.0 | 447 | 0.029 | 100 | 4.1 | LOS A | 0.1 | 0.9 | Full | 60 | 0.0 | 0.0 |
| Approach | 610 | 13.3 | 610 | 13.3 | | 0.372 | | 6.0 | LOS A | 2.6 | 19.6 | | | | |
| SouthWest: Mattson Road | | | | | | | | | | | | | | | |
| Lane 1 | 27 | 3.7 | 27 | 3.7 | 252 | 0.107 | 100 | 26.0 | LOS C | 0.5 | 3.9 | Full | 282 | 0.0 | 0.0 |
| Lane 2 | 38 | 5.3 | 38 | 5.3 | 214 | 0.178 | 100 | 27.5 | LOS C | 0.8 | 5.9 | Full | 282 | 0.0 | 0.0 |
| Approach | 65 | 4.6 | 65 | 4.6 | | 0.178 | | 26.9 | LOS C | 0.8 | 5.9 | | | | |
| Intersection | 1890 | 11.1 | 1890 | 11.1 | | 0.771 | | 16.2 | LOS B | 11.7 | 88.5 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.

Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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

## Approach Lane Flows (CCG) (veh/h)

Site: 7.0 [7.0 William Roberts Rd / Ti Rakau Dr]

SouthEast: Ti Rakau Drive (East)

| Mov. From SE To Exit: | T1 NW | R2 NE | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 383 | - | 383 | 9.1 | 696 | 0.551 | 100 | NA | NA |
| Lane 2 | 383 | - | 383 | 9.1 | 696 | 0.551 | 100 | NA | NA |
| Lane 3 | 383 | - | 383 | 9.1 | 696 | 0.551 | 100 | NA | NA |
| Lane 4 | - | 61 | 61 | 4.9 | 250 | 0.244 | 100 | 0.0 | 3 |
| Lane 5 | 17 | - | 17 | 100.0 | 454 | 0.037 | 100 | NA | NA |
| Approach | 1167 | 61 | 1228 | 10.2 | | 0.551 | | | |

NorthEast: William Roberts Road Extension

| Mov. From NE To Exit: | L2 SE | R2 NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 86 | - | 86 | 3.5 | 252 | 0.341 | 100 | 0.0 | 2 |
| Lane 2 | - | 53 | 53 | 7.5 | 210 | 0.252 | 100 | NA | NA |
| Approach | 86 | 53 | 139 | 5.0 | | 0.341 | | | |

NorthWest: Ti Rakau Drive (West)

| Mov. From NW To Exit: | L2 NE | T1 SE | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 26 | 83 | 109 | 12.5 | 341 | 0.319 | 100 | NA | NA |
| Lane 2 | - | 217 | 217 | 12.8 | 681 | 0.319 | 100 | NA | NA |
| Lane 3 | - | 217 | 217 | 12.8 | 681 | 0.319 | 100 | NA | NA |
| Lane 4 | - | 13 | 13 | 100.0 | 454 | 0.029 | 100 | NA | NA |
| Approach | 26 | 530 | 556 | 14.7 | | 0.319 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 1923 | 11.1 | 0.551 |

Site: 7.5 [7.5 Mattson Rd/ Ti Rakau Dr]

SouthEast: Ti Rakau Drive (East)

| Mov. From SE To Exit: | L2 SW | T1 NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 11 | 245 | 256 | 9.0 | 332 | 0.771 | 100 | 82.2 | 2 |
| Lane 2 | - | 405 | 405 | 9.0 | 525[1] | 0.771 | 100 | NA | NA |
| Lane 3 | - | 537 | 537 | 9.0 | 696 | 0.771 | 100 | NA | NA |
| Lane 4 | - | 17 | 17 | 100.0 | 447 | 0.038 | 100 | NA | NA |
| Approach | 11 | 1204 | 1215 | 10.3 | | 0.771 | | | |

NorthWest: Ti Rakau Drive (West)

| Mov. From NW To Exit: | T1 SE | R2 SW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 70 | - | 70 | 11.2 | 687 | 0.101 | 27[6] | NA | NA |
| Lane 2 | 256 | - | 256 | 11.2 | 687 | 0.372 | 100 | NA | NA |
| Lane 3 | 256 | - | 256 | 11.2 | 687 | 0.372 | 100 | NA | NA |
| Lane 4 | - | 16 | 16 | 18.8 | 228 | 0.070 | 100 | 0.0 | 3 |
| Lane 5 | 13 | - | 13 | 100.0 | 447 | 0.029 | 100 | NA | NA |
| Approach | 594 | 16 | 610 | 13.3 | | 0.372 | | | |
| SouthWest: Mattson Road | | | | | | | | | |
| Mov. From SW To Exit: | L2 NW | R2 SE | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 27 | - | 27 | 3.7 | 252 | 0.107 | 100 | NA | NA |
| Lane 2 | - | 38 | 38 | 5.3 | 214 | 0.178 | 100 | NA | NA |
| Approach | 27 | 38 | 65 | 4.6 | | 0.178 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 1890 | 11.1 | 0.771 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

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

6 Lane under-utilisation due to downstream effects

| Merge Analysis (CCG) | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | Opposing Flow Rate pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site: 7.0 [7.0 William Roberts Rd / Ti Rakau Dr] | | | | | | | | | | | | |
| SouthEast Exit: Ti Rakau Drive (East)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 4 | Merge Analysis not applied. | | | | | | | | | | |
| NorthEast Exit: William Roberts Road Extension<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| NorthWest Exit: Ti Rakau Drive (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 4 | Merge Analysis not applied. | | | | | | | | | | |
| Site: 7.5 [7.5 Mattson Rd/ Ti Rakau Dr] | | | | | | | | | | | | |
| SouthEast Exit: Ti Rakau Drive (East)<br>Merge Type: **Priority** | | | | | | | | | | | | |
| Exit Short Lane | 1 | 40 | 0.0 | 256 | 270 | 3.00 | 2.00 | 70 | 1526 | 0.046 | 0.4 | 0.5 |
| Merge Lane | 2 | - | 100.0 | Merge Lane is not Opposed | | | | 256 | 1800 | 0.142 | 0.0 | 0.0 |
| NorthWest Exit: Ti Rakau Drive (West) | | | | | | | | | | | | |

| | | |
|---|---|---|
| Merge Type: **Not Applied** | | |
| Full Length Lane | 1 | Merge Analysis not applied. |
| Full Length Lane | 2 | Merge Analysis not applied. |
| Full Length Lane | 3 | Merge Analysis not applied. |
| Full Length Lane | 4 | Merge Analysis not applied. |
| SouthWest Exit: Mattson Road<br>Merge Type: **Not Applied** | | |
| Full Length Lane | 1 | Merge Analysis not applied. |

# LANE SUMMARY

## Site: 1.0 [1.0 Pakuranga Rd / Ti Rakau Dr (Site Folder: PM)]

## Network: N101 [PM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated    Cycle Time = 120 seconds (Site Practical Cycle Time)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total | HV ] | ARRIVAL FLOWS [ Total | HV ] | Cap. | Deg. Satn | Lane Util. | Aver. Delay | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] | Lane Config | Lane Length | Cap. Adj. | Prob. Block. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | veh/h | % | veh/h | % | veh/h | v/c | % | sec | | | m | | m | % | % |
| **South: Ti Rakau Drive** | | | | | | | | | | | | | | | |
| Lane 1 | 413 | 6.5 | 413 | 6.5 | 1094[1] | 0.377 | 100 | 7.6 | LOS A | 5.4 | 39.8 | Full | 174 | 0.0 | 0.0 |
| Lane 2 (B) | 13 | 100.0 | 13 | 100.0 | 82 | 0.158 | 100 | 64.6 | LOS E | 0.7 | 8.6 | Short | 16 | 0.0 | NA |
| Lane 3 | 63 | 5.6 | 63 | 5.6 | 311 | 0.201 | 100 | 50.7 | LOS D | 2.8 | 20.8 | Full | 174 | 0.0 | 0.0 |
| Lane 4 | 63 | 5.6 | 63 | 5.6 | 311 | 0.201 | 100 | 50.7 | LOS D | 2.8 | 20.8 | Short | 40 | 0.0 | NA |
| Approach | 551 | 8.5 | 551 | 8.5 | | 0.377 | | 18.7 | LOS B | 5.4 | 39.8 | | | | |
| **East: Pakuranga Road (East)** | | | | | | | | | | | | | | | |
| Lane 1 | 497 | 6.4 | 497 | 6.4 | 570[1] | 0.872 | 100 | 47.2 | LOS D | 19.4[N4] | 143.2[N4] | Short | 21 | 0.0 | NA |
| Lane 2 | 191 | 3.4 | 191 | 3.4 | 385[1] | 0.497 | 100 | 24.1 | LOS C | 6.4 | 46.2 | Full | 98 | 0.0 | 50.0[8] |
| Lane 3 | 260 | 7.5 | 260 | 7.5 | 522 | 0.497 | 100 | 38.7 | LOS D | 11.4 | 84.8 | Full | 98 | 0.0 | 1.9 |
| Approach | 948 | 6.1 | 948 | 6.1 | | 0.872 | | 40.2 | LOS D | 19.4 | 143.2 | | | | |
| **West: Pakuranga Road (West)** | | | | | | | | | | | | | | | |
| Lane 1 (B) | 42 | 100.0 | 42 | 100.0 | 57 | 0.735 | 100 | 70.1 | LOS E | 2.5 | 31.9 | Full | 380 | 0.0 | 0.0 |
| Lane 2 | 462 | 5.4 | 462 | 5.4 | 593 | 0.778 | 100 | 41.8 | LOS D | 22.6 | 165.8 | Full | 380 | 0.0 | 0.0 |
| Lane 3 | 462 | 5.4 | 462 | 5.4 | 593 | 0.778 | 100 | 41.8 | LOS D | 22.6 | 165.8 | Full | 380 | 0.0 | 0.0 |
| Lane 4 | 189 | 8.3 | 189 | 8.3 | 276 | 0.686 | 100 | 58.1 | LOS E | 9.8 | 73.2 | Short | 178 | 0.0 | NA |
| Lane 5 | 147 | 8.3 | 147 | 8.3 | 213 | 0.686 | 100 | 59.3 | LOS E | 7.7 | 57.7 | Short | 105 | -22.7[N3] | NA |
| Approach | 1301 | 9.2 | 1301 | 9.2 | | 0.778 | | 47.1 | LOS D | 22.6 | 165.8 | | | | |
| Intersection | 2800 | 8.0 | 2800 | 8.0 | | 0.872 | | 39.2 | LOS D | 22.6 | 165.8 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
8 Probability of Blockage has been set on the basis of a queue that overflows from a short lane.
N3 Capacity Adjustment due to downstream lane blockage determined by the program.
N4 Average back of queue has been restricted to the available queue storage space.

**Approach Lane Flows (veh/h)**

| Mov. From S To Exit: | L2 W | R2 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| **South: Ti Rakau Drive** | | | | | | | | | |
| Lane 1 | 413 | - | 413 | 6.5 | 1094[1] | 0.377 | 100 | NA | NA |
| Lane 2 | 13 | - | 13 | 100.0 | 82 | 0.158 | 100 | 0.0 | 1 |
| Lane 3 | - | 63 | 63 | 5.6 | 311 | 0.201 | 100 | NA | NA |
| Lane 4 | - | 63 | 63 | 5.6 | 311 | 0.201 | 100 | 0.0 | 3 |
| Approach | 426 | 125 | 551 | 8.5 | | 0.377 | | | |
| **East: Pakuranga Road (East)** | | | | | | | | | |

| Mov. From E To Exit: | L2 S | T1 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 497 | - | 497 | 6.4 | 570[1] | 0.872 | 100 | 100.0 | 2 |
| Lane 2 | - | 191 | 191 | 3.4 | 385[1] | 0.497 | 100 | NA | NA |
| Lane 3 | - | 260 | 260 | 7.5 | 522 | 0.497 | 100 | NA | NA |
| Approach | 497 | 451 | 948 | 6.1 | | 0.872 | | | |

West: Pakuranga Road (West)

| Mov. From W To Exit: | T1 E | R2 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 21 | 21 | 42 | 100.0 | 57 | 0.735 | 100 | NA | NA |
| Lane 2 | 462 | - | 462 | 5.4 | 593 | 0.778 | 100 | NA | NA |
| Lane 3 | 462 | - | 462 | 5.4 | 593 | 0.778 | 100 | NA | NA |
| Lane 4 | - | 189 | 189 | 8.3 | 276 | 0.686 | 100 | 0.0 | 3 |
| Lane 5 | - | 147 | 147 | 8.3 | 213 | 0.686 | 100 | 0.0 | 4 |
| Approach | 944 | 357 | 1301 | 9.2 | | 0.778 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 2800 | 8.0 | 0.872 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

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

## Merge Analysis

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South Exit: Ti Rakau Drive<br>Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | |
| East Exit: Pakuranga Road (East)<br>Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | |
| West Exit: Pakuranga Road (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | |

# LANE SUMMARY

## Site: 2.1 [2.1 Pakuranga Plaza / Pakuranga Rd (Site Folder: PM)]

## Network: N101 [PM (Network Folder: General)]

Site Category: (None)
Give-Way (Two-Way)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Pakuranga Road (East) | | | | | | | | | | | | | | | |
| Lane 1 | 472 | 6.8 | 472 | 6.8 | 1850 | 0.255 | 100 | 0.7 | LOS A | 0.0 | 0.0 | Full | 121 | 0.0 | 0.0 |
| Lane 2 | 479 | 5.0 | 479 | 5.0 | 1879 | 0.255 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 121 | 0.0 | 0.0 |
| Approach | 951 | 5.9 | 951 | 5.9 | | 0.255 | | 0.4 | NA | 0.0 | 0.0 | | | | |
| West: Pakuranga Road (West) | | | | | | | | | | | | | | | |
| Lane 1 | 532 | 7.2 | 531 | 7.2 | 1853 | 0.287 | 100 | 0.0 | LOS A | 10.7 [N5] | 79.3 [N5] | Full | 108 | 0.0 | 0.0 |
| Lane 2 | 532 | 7.2 | 531 | 7.2 | 1853 | 0.287 | 100 | 0.0 | LOS A | 8.5 [N5] | 63.0 [N5] | Full | 108 | 0.0 | 0.0 |
| Approach | 1063 | 7.2 | 1063 | 7.2 | | 0.287 | | 0.0 | NA | 10.7 | 79.3 | | | | |
| SouthWest: Pakuranga Plaza | | | | | | | | | | | | | | | |
| Lane 1 | 52 | 5.8 | 52 | 5.8 | 883 | 0.059 | 100 | 2.0 | LOS A | 0.2 | 1.3 | Full | 196 | 0.0 | 0.0 |
| Approach | 52 | 5.8 | 52 | 5.8 | | 0.059 | | 2.0 | LOS A | 0.2 | 1.3 | | | | |
| Intersection | 2066 | 6.6 | 2066 | 6.6 | | 0.287 | | 0.2 | NA | 10.7 | 79.3 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N5 Continuous Lane results determined by Back of Queue values of downstream lanes (proportional to lane movement flows).

**Approach Lane Flows (veh/h)**

East: Pakuranga Road (East)

| Mov. From E To Exit: | L1 SW | T1 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 63 | 409 | 472 | 6.8 | 1850 | 0.255 | 100 | NA | NA |
| Lane 2 | - | 479 | 479 | 5.0 | 1879 | 0.255 | 100 | NA | NA |
| Approach | 63 | 888 | 951 | 5.9 | | 0.255 | | | |

West: Pakuranga Road (West)

| Mov. From W To Exit: | T1 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|
| Lane 1 | 531 | 531 | 7.2 | 1853 | 0.287 | 100 | NA | NA |
| Lane 2 | 531 | 531 | 7.2 | 1853 | 0.287 | 100 | NA | NA |
| Approach | 1063 | 1063 | 7.2 | | 0.287 | | | |

SouthWest: Pakuranga Plaza

| Mov. From SW To Exit: | L3 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Lane 1 | 52 | 52 | 5.8 | 883 | 0.059 | 100 | NA | NA |
| Approach | 52 | 52 | 5.8 | | 0.059 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 2066 | 6.6 | 0.287 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

| Merge Analysis | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| East Exit: Pakuranga Road (East)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| West Exit: Pakuranga Road (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| SouthWest Exit: Pakuranga Plaza<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |

# LANE SUMMARY

## Site: 3.0 [3.0 Pakuranga Highway / Pakuranga Rd (Site Folder: PM)]

## Network: N101 [PM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated    Cycle Time = 134 seconds (Site User-Given Phase Times)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total | HV ] | ARRIVAL FLOWS [ Total | HV ] | Cap. | Deg. Satn | Lane Util. | Aver. Delay | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] | Lane Config | Lane Length | Cap. Adj. | Prob. Block. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | veh/h | % | veh/h | % | veh/h | v/c | % | sec | | | m | | m | % | % |
| East: Pakuranga Road (East) | | | | | | | | | | | | | | | |
| Lane 1 | 215 | 6.3 | 215 | 6.3 | 734 | 0.293 | 100 | 23.6 | LOS C | 7.0 | 51.6 | Full | 183 | 0.0 | 0.0 |
| Lane 2 | 215 | 6.3 | 215 | 6.3 | 734 | 0.293 | 100 | 23.6 | LOS C | 7.0 | 51.6 | Full | 183 | 0.0 | 0.0 |
| Lane 3 | 200 | 5.8 | 200 | 5.8 | 546 | 0.366 | 100 | 43.2 | LOS D | 9.2 | 67.2 | Full | 183 | 0.0 | 0.0 |
| Lane 4 | 200 | 5.8 | 200 | 5.8 | 546 | 0.366 | 100 | 43.2 | LOS D | 9.2 | 67.2 | Short | 60 | 0.0 | NA |
| Approach | 829 | 6.0 | 829 | 6.0 | | 0.366 | | 33.1 | LOS C | 9.2 | 67.2 | | | | |
| NorthWest: Pakuranga Road (West) | | | | | | | | | | | | | | | |
| Lane 1 | 495 | 8.5 | 495 | 8.5 | 536 | 0.924 | 100 | 72.0 | LOS E | 23.5 [N4] | 176.8 [N4] | Full | 121 | 0.0 | 50.0 |
| Lane 2 | 482 | 4.5 | 482 | 4.5 | 521 [1] | 0.924 | 100 | 71.4 | LOS E | 24.3 [N4] | 176.8 [N4] | Full | 121 | 0.0 | 50.0 |
| Lane 3 | 80 | 15.0 | 80 | 15.0 | 112 | 0.714 | 100 | 76.3 | LOS E | 5.0 | 39.2 | Short | 98 | 0.0 | NA |
| Approach | 1057 | 7.2 | 1057 | 7.2 | | 0.924 | | 72.0 | LOS E | 24.3 | 176.8 | | | | |
| SouthWest: Flyover | | | | | | | | | | | | | | | |
| Lane 1 | 554 | 6.0 | 554 | 6.0 | 628 [1] | 0.882 | 100 | 38.8 | LOS D | 23.5 | 172.8 | Short | 70 | 0.0 | NA |
| Lane 2 | 637 | 5.4 | 637 | 5.4 | 649 [1] | 0.982 | 100 | 79.8 | LOS E | 43.8 | 320.9 | Full | 1162 | 0.0 | 0.0 |
| Lane 3 | 984 | 5.4 | 984 | 5.4 | 1002 | 0.982 | 100 | 76.6 | LOS E | 77.5 | 567.7 | Full | 1162 | 0.0 | 0.0 |
| Approach | 2175 | 5.5 | 2175 | 5.5 | | 0.982 | | 67.9 | LOS E | 77.5 | 567.7 | | | | |
| Intersection | 4061 | 6.1 | 4061 | 6.1 | | 0.982 | | 61.9 | LOS E | 77.5 | 567.7 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
N4 Average back of queue has been restricted to the available queue storage space.

**Approach Lane Flows (veh/h)**

East: Pakuranga Road (East)

| Mov. From E To Exit: | L1 SW | R1 NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 215 | - | 215 | 6.3 | 734 | 0.293 | 100 | NA | NA |
| Lane 2 | 215 | - | 215 | 6.3 | 734 | 0.293 | 100 | NA | NA |
| Lane 3 | - | 200 | 200 | 5.8 | 546 | 0.366 | 100 | NA | NA |
| Lane 4 | - | 200 | 200 | 5.8 | 546 | 0.366 | 100 | 25.4 | 3 |
| Approach | 430 | 399 | 829 | 6.0 | | 0.366 | | | |

NorthWest: Pakuranga Road (West)

| Mov. From NW To Exit: | L1 E | R2 SW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 495 | - | 495 | 8.5 | 536 | 0.924 | 100 | NA | NA |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 2 | 482 | - | 482 | 4.5 | 521 [1] | 0.924 | 100 | NA | NA |
| Lane 3 | - | 80 | 80 | 15.0 | 112 | 0.714 | 100 | 0.0 | 2 |
| Approach | 977 | 80 | 1057 | 7.2 | | 0.924 | | | |
| SouthWest: Flyover | | | | | | | | | |
| Mov. From SW To Exit: | L2 NW | R1 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 554 | - | 554 | 6.0 | 628 [1] | 0.882 | 100 | 100.0 | 2 |
| Lane 2 | - | 637 | 637 | 5.4 | 649 [1] | 0.982 | 100 | NA | NA |
| Lane 3 | - | 984 | 984 | 5.4 | 1002 | 0.982 | 100 | NA | NA |
| Approach | 554 | 1621 | 2175 | 5.5 | | 0.982 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 4061 | 6.1 | 0.982 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

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

## Merge Analysis

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | Opposing Flow Rate pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| East Exit: Pakuranga Road (East)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | | |
| NorthWest Exit: Pakuranga Road (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| SouthWest Exit: Flyover<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |

# LANE SUMMARY

## Site: 7.1 [7.1 William Roberts Rd / Cortina Pl (Site Folder: PM)]

## Network: N101 [PM (Network Folder: General)]

Site Category: (None)
Give-Way (Two-Way)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NorthEast: William Roberts Road (North) | | | | | | | | | | | | | | | |
| Lane 1 | 152 | 3.3 | 152 | 3.3 | 1852 | 0.082 | 100 | 0.3 | LOS A | 0.1 | 0.6 | Full | 223 | 0.0 | 0.0 |
| Approach | 152 | 3.3 | 152 | 3.3 | | 0.082 | | 0.3 | NA | 0.1 | 0.6 | | | | |
| NorthWest: Cortina Place | | | | | | | | | | | | | | | |
| Lane 1 | 64 | 6.3 | 64 | 6.3 | 1039 | 0.062 | 100 | 3.4 | LOS A | 0.2 | 1.3 | Full | 177 | 0.0 | 0.0 |
| Approach | 64 | 6.3 | 64 | 6.3 | | 0.062 | | 3.4 | LOS A | 0.2 | 1.3 | | | | |
| SouthWest: William Roberts Road (South) | | | | | | | | | | | | | | | |
| Lane 1 | 221 | 5.9 | 221 | 5.9 | 1809 | 0.122 | 100 | 0.4 | LOS A | 0.0 | 0.0 | Full | 110 | 0.0 | 0.0 |
| Approach | 221 | 5.9 | 221 | 5.9 | | 0.122 | | 0.4 | NA | 0.0 | 0.0 | | | | |
| Intersection | 437 | 5.0 | 437 | 5.0 | | 0.122 | | 0.8 | NA | 0.2 | 1.3 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

**Approach Lane Flows (veh/h)**

NorthEast: William Roberts Road (North)

| Mov. From NE To Exit: | T1 SW | R2 NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 142 | 10 | 152 | 3.3 | 1852 | 0.082 | 100 | NA | NA |
| Approach | 142 | 10 | 152 | 3.3 | | 0.082 | | | |

NorthWest: Cortina Place

| Mov. From NW To Exit: | L2 NE | R2 SW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 19 | 45 | 64 | 6.3 | 1039 | 0.062 | 100 | NA | NA |
| Approach | 19 | 45 | 64 | 6.3 | | 0.062 | | | |

SouthWest: William Roberts Road (South)

| Mov. From SW To Exit: | L2 NW | T1 NE | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 48 | 173 | 221 | 5.9 | 1809 | 0.122 | 100 | NA | NA |
| Approach | 48 | 173 | 221 | 5.9 | | 0.122 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|

| | | | |
|---|---|---|---|
| Intersection | 437 | 5.0 | 0.122 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

**Merge Analysis**

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NorthEast Exit: William Roberts Road (North)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| NorthWest Exit: Cortina Place<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| SouthWest Exit: William Roberts Road (South)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |

# LANE SUMMARY

## Site: 4.0 [4.0 Palm Ave / Aylesbury St (Site Folder: PM)]

## Network: N101 [PM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated    Cycle Time = 100 seconds (Site Practical Cycle Time)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **South: Ti Rakau Drive (East)** | | | | | | | | | | | | | | | |
| Lane 1 | 248 | 9.0 | 248 | 9.0 | 299 | 0.831 | 100 | 51.1 | LOS D | 11.8 | 89.0 | Full | 110 | 0.0 | 0.0 |
| Lane 2 | 257 | 9.2 | 257 | 9.2 | 309 | 0.831 | 100 | 50.8 | LOS D | 12.2 | 91.8 | Short | 80 | 0.0 | NA |
| Approach | 505 | 9.1 | 505 | 9.1 | | 0.831 | | 51.0 | LOS D | 12.2 | 91.8 | | | | |
| **East: Aylesbury Street** | | | | | | | | | | | | | | | |
| Lane 1 | 35 | 8.6 | 35 | 8.6 | 102 | 0.344 | 100 | 54.5 | LOS D | 1.6 | 11.9 | Short | 30 | 0.0 | NA |
| Lane 2 | 91 | 3.3 | 91 | 3.3 | 108 | 0.840 | 100 | 60.7 | LOS E | 4.5 | 32.4 | Full | 40 | 0.0 | 0.0 |
| Approach | 126 | 4.8 | 126 | 4.8 | | 0.840 | | 59.0 | LOS E | 4.5 | 32.4 | | | | |
| **North: Ti Rakau Drive (West)** | | | | | | | | | | | | | | | |
| Lane 1 | 295 | 9.5 | 295 | 9.5 | 865 | 0.342 | 39[6] | 18.3 | LOS B | 8.1 | 61.2 | Full | 174 | 0.0 | 0.0 |
| Lane 2 | 554 | 9.6 | 554 | 9.6 | 639 | 0.866 | 100 | 37.5 | LOS D | 26.2 | 198.7 | Full | 174 | -26.5[N3] | 27.1 |
| Approach | 849 | 9.5 | 849 | 9.5 | | 0.866 | | 30.8 | LOS C | 26.2 | 198.7 | | | | |
| **West: Palm Avenue** | | | | | | | | | | | | | | | |
| Lane 1 | 63 | 6.3 | 63 | 6.3 | 101 | 0.622 | 100 | 58.7 | LOS E | 3.0 | 21.8 | Full | 87 | -6.7[N3] | 0.0 |
| Approach | 63 | 6.3 | 63 | 6.3 | | 0.622 | | 58.7 | LOS E | 3.0 | 21.8 | | | | |
| Intersection | 1543 | 8.9 | 1543 | 8.9 | | 0.866 | | 40.9 | LOS D | 26.2 | 198.7 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

6 Lane under-utilisation due to downstream effects
N3 Capacity Adjustment due to downstream lane blockage determined by the program.

**Approach Lane Flows (veh/h)**

South: Ti Rakau Drive (East)

| Mov. From S To Exit: | L2 W | T1 N | R2 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 38 | 210 | - | 248 | 9.0 | 299 | 0.831 | 100 | NA | NA |
| Lane 2 | - | 222 | 35 | 257 | 9.2 | 309 | 0.831 | 100 | 27.5 | 1 |
| Approach | 38 | 432 | 35 | 505 | 9.1 | | 0.831 | | | |

East: Aylesbury Street

| Mov. From E To Exit: | L2 S | T1 W | R2 N | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 35 | - | - | 35 | 8.6 | 102 | 0.344 | 100 | 0.0 | 2 |
| Lane 2 | - | 10 | 81 | 91 | 3.3 | 108 | 0.840 | 100 | NA | NA |
| Approach | 35 | 10 | 81 | 126 | 4.8 | | 0.840 | | | |

| North: Ti Rakau Drive (West) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mov. From N To Exit: | L2 E | T1 S | R2 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 19 | 276 | - | 295 | 9.5 | 865 | 0.342 | 39 [6] | NA | NA |
| Lane 2 | - | 534 | 20 | 554 | 9.6 | 639 | 0.866 | 100 | NA | NA |
| Approach | 19 | 810 | 20 | 849 | 9.5 | | 0.866 | | | |

| West: Palm Avenue | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Mov. From W To Exit: | L2 N | T1 E | R2 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 41 | 10 | 12 | 63 | 6.3 | 101 | 0.622 | 100 | NA | NA |
| Approach | 41 | 10 | 12 | 63 | 6.3 | | 0.622 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 1543 | 8.9 | 0.866 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

6 Lane under-utilisation due to downstream effects

## Merge Analysis

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | Opposing Flow Rate pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South Exit: Ti Rakau Drive (East)<br>Merge Type: **Zipper** | | | | | | | | | | | | |
| Exit Short Lane | 1 | 70 | 50.0 | 273 | 286 | 2.50 | 2.00 | 311 | 1450 | 0.215 | 0.1 | 0.2 |
| Merge Lane | 2 | - | 50.0 | 156 | 163 | 2.50 | 2.00 | 546 | 1610 | 0.339 | 0.0 | 0.1 |
| East Exit: Aylesbury Street<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| North Exit: Ti Rakau Drive (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| West Exit: Palm Avenue<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |

# LANE SUMMARY

## Site: 5.0 [5.0 Pakuranga Highway/ Reeves Rd (Site Folder: PM)]

## Network: N101 [PM (Network Folder: General)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated    Cycle Time = 40 seconds (Site Practical Cycle Time)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast: Ti Rakau Drive (East) | | | | | | | | | | | | | | | |
| Lane 1 | 478 | 10.3 | 478 | 10.3 | 947 | 0.505 | 100 | 10.7 | LOS B | 5.4 | 40.8 | Full | 90 | 0.0 | 0.0 |
| Lane 2 | 441 | 8.8 | 441 | 8.8 | 1009 | 0.437 | 100 | 5.9 | LOS A | 4.7 | 35.3 | Full | 90 | 0.0 | 0.0 |
| Approach | 919 | 9.6 | 919 | 9.6 | | 0.505 | | 8.4 | LOS A | 5.4 | 40.8 | | | | |
| NorthWest: Ti Rakau Drive (West) | | | | | | | | | | | | | | | |
| Lane 1 | 857 | 9.6 | 857 | 9.6 | 1020 | 0.840 | 100 | 14.7 | LOS B | 16.6 | 125.8 | Full | 110 | 0.0 | 27.3 |
| Approach | 857 | 9.6 | 857 | 9.6 | | 0.840 | | 14.7 | LOS B | 16.6 | 125.8 | | | | |
| SouthWest: Pakuranga HWY | | | | | | | | | | | | | | | |
| Lane 1 | 66 | 9.1 | 66 | 9.1 | 260 | 0.254 | 100 | 25.0 | LOS C | 1.1 | 8.4 | Full | 623 | 0.0 | 0.0 |
| Approach | 66 | 9.1 | 66 | 9.1 | | 0.254 | | 25.0 | LOS C | 1.1 | 8.4 | | | | |
| Intersection | 1842 | 9.6 | 1842 | 9.6 | | 0.840 | | 11.9 | LOS B | 16.6 | 125.8 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

**Approach Lane Flows (veh/h)**

SouthEast: Ti Rakau Drive (East)

| Mov. From SE To Exit: | L2 SW | T1 NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 478 | - | 478 | 10.3 | 947 | 0.505 | 100 | NA | NA |
| Lane 2 | - | 441 | 441 | 8.8 | 1009 | 0.437 | 100 | NA | NA |
| Approach | 478 | 441 | 919 | 9.6 | | 0.505 | | | |

NorthWest: Ti Rakau Drive (West)

| Mov. From NW To Exit: | T1 SE | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|
| Lane 1 | 857 | 857 | 9.6 | 1020 | 0.840 | 100 | NA | NA |
| Approach | 857 | 857 | 9.6 | | 0.840 | | | |

SouthWest: Pakuranga HWY

| Mov. From SW To Exit: | L2 NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|
| Lane 1 | 66 | 66 | 9.1 | 260 | 0.254 | 100 | NA | NA |
| Approach | 66 | 66 | 9.1 | | 0.254 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|

| | | | |
|---|---|---|---|
| Intersection | 1842 | 9.6 | 0.840 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

| Merge Analysis | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | Opposing Flow Rate pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast Exit: Ti Rakau Drive (East)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| NorthWest Exit: Ti Rakau Drive (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| SouthWest Exit: Pakuranga HWY<br>Merge Type: **Priority** | | | | | | | | | | | | |
| Exit Short Lane | 2 | 10 | 0.0 | 478 | 503 | 3.00 | 2.00 | 0 | 1284 | 0.000 | 0.8 | 0.8 |
| Merge Lane | 1 | - | 100.0 | Merge Lane is not Opposed | | | | 478 | 1800 | 0.266 | 0.0 | 0.0 |

# CCG LANE SUMMARY

## Common Control Group: CCG2 [WRR / Mattson]

## Network: N101 [PM (Network Folder: General)]

EQUISAT (Fixed-Time/SCATS) Isolated     Cycle Time = 50 seconds (CCG Practical Cycle Time)

| Lane Use and Performance (CCG) | DEMAND FLOWS [ Total | HV ] | ARRIVAL FLOWS [ Total | HV ] | Cap. | Deg. Satn | Lane Util. | Aver. Delay | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] | Lane Config | Lane Length | Cap. Adj. | Prob. Block. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | veh/h | % | veh/h | % | veh/h | v/c | % | sec | | | m | | m | % | % |
| **Site: 7.0 [7.0 William Roberts Rd / Ti Rakau Dr]** | | | | | | | | | | | | | | | |
| **SouthEast: Ti Rakau Drive (East)** | | | | | | | | | | | | | | | |
| Lane 1 | 295 | 8.3 | 295 | 8.3 | 589 | 0.500 | 100 | 15.1 | LOS B | 5.4 | 40.1 | Full | 60 | 0.0 | 0.0 |
| Lane 2 | 295 | 8.3 | 295 | 8.3 | 589 | 0.500 | 100 | 5.3 | LOS A | 2.5 | 18.9 | Full | 60 | 0.0 | 0.0 |
| Lane 3 | 295 | 8.3 | 295 | 8.3 | 589 | 0.500 | 100 | 5.3 | LOS A | 2.5 | 18.9 | Full | 60 | 0.0 | 0.0 |
| Lane 4 | 155 | 2.6 | 155 | 2.6 | 363 | 0.427 | 100 | 28.7 | LOS C | 3.5 | 25.3 | Short | 20 | 0.0 | NA |
| Lane 5 (B) | 13 | 100.0 | 13 | 100.0 | 382 | 0.034 | 100 | 6.9 | LOS A | 0.1 | 1.4 | Full | 60 | 0.0 | 0.0 |
| Approach | 1052 | 8.6 | 1052 | 8.6 | | 0.500 | | 11.5 | LOS B | 5.4 | 40.1 | | | | |
| **NorthEast: William Roberts Road Extension** | | | | | | | | | | | | | | | |
| Lane 1 | 123 | 3.3 | 123 | 3.3 | 361 | 0.341 | 100 | 21.5 | LOS C | 2.4 | 17.5 | Short | 80 | 0.0 | NA |
| Lane 2 | 64 | 3.1 | 64 | 3.1 | 217 | 0.295 | 100 | 25.1 | LOS C | 1.4 | 9.9 | Full | 110 | 0.0 | 0.0 |
| Approach | 187 | 3.2 | 187 | 3.2 | | 0.341 | | 22.7 | LOS C | 2.4 | 17.5 | | | | |
| **NorthWest: Ti Rakau Drive (West)** | | | | | | | | | | | | | | | |
| Lane 1 | 154 | 10.0 | 154 | 10.0 | 265 | 0.580 | 100 | 24.9 | LOS C | 3.1 | 23.8 | Full | 107 | 0.0 | 0.0 |
| Lane 2 | 344 | 7.4 | 344 | 7.4 | 592 | 0.580 | 100 | 15.9 | LOS B | 6.5 | 48.4 | Full | 107 | 0.0 | 0.0 |
| Lane 3 | 344 | 7.4 | 344 | 7.4 | 592 | 0.580 | 100 | 15.9 | LOS B | 6.5 | 48.4 | Full | 107 | 0.0 | 0.0 |
| Lane 4 (B) | 17 | 100.0 | 17 | 100.0 | 382 | 0.044 | 100 | 6.9 | LOS A | 0.1 | 1.9 | Full | 107 | 0.0 | 0.0 |
| Approach | 858 | 9.7 | 858 | 9.7 | | 0.580 | | 17.3 | LOS B | 6.5 | 48.4 | | | | |
| Intersection | 2097 | 8.5 | 2097 | 8.5 | | 0.580 | | 14.9 | LOS B | 6.5 | 48.4 | | | | |
| **Site: 7.5 [7.5 Mattson Rd/ Ti Rakau Dr]** | | | | | | | | | | | | | | | |
| **SouthEast: Ti Rakau Drive (East)** | | | | | | | | | | | | | | | |
| Lane 1 | 185 | 7.8 | 185 | 7.8 | 229 | 0.807 | 100 | 36.5 | LOS D | 5.2 | 38.6 | Short | 25 | 0.0 | NA |
| Lane 2 | 386 | 7.5 | 386 | 7.5 | 478 [1] | 0.807 | 100 | 21.3 | LOS C | 8.8 | 65.5 | Full | 143 | 0.0 | 0.0 |
| Lane 3 | 478 | 7.5 | 478 | 7.5 | 592 | 0.807 | 100 | 21.7 | LOS C | 11.3 | 84.4 | Full | 143 | 0.0 | 0.0 |
| Lane 4 (B) | 13 | 100.0 | 13 | 100.0 | 376 | 0.035 | 100 | 6.9 | LOS A | 0.1 | 1.4 | Full | 143 | 0.0 | 0.0 |
| Approach | 1061 | 8.7 | 1061 | 8.7 | | 0.807 | | 23.9 | LOS C | 11.3 | 84.4 | | | | |
| **NorthWest: Ti Rakau Drive (West)** | | | | | | | | | | | | | | | |
| Lane 1 | 100 | 6.9 | 100 | 6.9 | 594 | 0.169 | 27 [6] | 17.8 | LOS B | 2.0 | 14.7 | Full | 60 | 0.0 | 0.0 |
| Lane 2 | 369 | 6.9 | 369 | 6.9 | 594 | 0.621 | 100 | 8.1 | LOS A | 4.8 | 35.9 | Full | 60 | 0.0 | 0.0 |
| Lane 3 | 369 | 6.9 | 369 | 6.9 | 594 | 0.621 | 100 | 2.9 | LOS A | 2.2 | 16.5 | Full | 60 | 0.0 | 0.0 |
| Lane 4 | 60 | 5.0 | 60 | 5.0 | 357 | 0.168 | 100 | 27.1 | LOS C | 1.4 | 9.9 | Short | 25 | 0.0 | NA |
| Lane 5 (B) | 17 | 100.0 | 17 | 100.0 | 376 | 0.045 | 100 | 6.9 | LOS A | 0.1 | 1.9 | Full | 60 | 0.0 | 0.0 |
| Approach | 915 | 8.5 | 915 | 8.5 | | 0.621 | | 8.3 | LOS A | 4.8 | 35.9 | | | | |
| **SouthWest: Mattson Road** | | | | | | | | | | | | | | | |
| Lane 1 | 13 | 7.7 | 13 | 7.7 | 350 | 0.037 | 100 | 22.5 | LOS C | 0.2 | 1.8 | Full | 282 | 0.0 | 0.0 |
| Lane 2 | 26 | 3.8 | 26 | 3.8 | 216 | 0.120 | 100 | 27.2 | LOS C | 0.5 | 3.9 | Full | 282 | 0.0 | 0.0 |
| Approach | 39 | 5.1 | 39 | 5.1 | | 0.120 | | 25.6 | LOS C | 0.5 | 3.9 | | | | |
| Intersection | 2015 | 8.5 | 2015 | 8.5 | | 0.807 | | 16.9 | LOS B | 11.3 | 84.4 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.

Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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

## Approach Lane Flows (CCG) (veh/h)

Site: 7.0 [7.0 William Roberts Rd / Ti Rakau Dr]

SouthEast: Ti Rakau Drive (East)

| Mov. From SE To Exit: | T1 NW | R2 NE | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 295 | - | 295 | 8.3 | 589 | 0.500 | 100 | NA | NA |
| Lane 2 | 295 | - | 295 | 8.3 | 589 | 0.500 | 100 | NA | NA |
| Lane 3 | 295 | - | 295 | 8.3 | 589 | 0.500 | 100 | NA | NA |
| Lane 4 | - | 155 | 155 | 2.6 | 363 | 0.427 | 100 | 36.7 | 3 |
| Lane 5 | 13 | - | 13 | 100.0 | 382 | 0.034 | 100 | NA | NA |
| Approach | 897 | 155 | 1052 | 8.6 | | 0.500 | | | |

NorthEast: William Roberts Road Extension

| Mov. From NE To Exit: | L2 SE | R2 NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 123 | - | 123 | 3.3 | 361 | 0.341 | 100 | 0.0 | 2 |
| Lane 2 | - | 64 | 64 | 3.1 | 217 | 0.295 | 100 | NA | NA |
| Approach | 123 | 64 | 187 | 3.2 | | 0.341 | | | |

NorthWest: Ti Rakau Drive (West)

| Mov. From NW To Exit: | L2 NE | T1 SE | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 67 | 87 | 154 | 10.0 | 265 | 0.580 | 100 | NA | NA |
| Lane 2 | - | 344 | 344 | 7.4 | 592 | 0.580 | 100 | NA | NA |
| Lane 3 | - | 344 | 344 | 7.4 | 592 | 0.580 | 100 | NA | NA |
| Lane 4 | - | 17 | 17 | 100.0 | 382 | 0.044 | 100 | NA | NA |
| Approach | 67 | 791 | 858 | 9.7 | | 0.580 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 2097 | 8.5 | 0.580 |

Site: 7.5 [7.5 Mattson Rd/ Ti Rakau Dr]

SouthEast: Ti Rakau Drive (East)

| Mov. From SE To Exit: | L2 SW | T1 NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 20 | 165 | 185 | 7.8 | 229 | 0.807 | 100 | 55.2 | 2 |
| Lane 2 | - | 386 | 386 | 7.5 | 478 [1] | 0.807 | 100 | NA | NA |
| Lane 3 | - | 478 | 478 | 7.5 | 592 | 0.807 | 100 | NA | NA |
| Lane 4 | - | 13 | 13 | 100.0 | 376 | 0.035 | 100 | NA | NA |
| Approach | 20 | 1041 | 1061 | 8.7 | | 0.807 | | | |

NorthWest: Ti Rakau Drive (West)

| Mov. From NW To Exit: | T1 SE | R2 SW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 100 | - | 100 | 6.9 | 594 | 0.169 | 27[6] | NA | NA |
| Lane 2 | 369 | - | 369 | 6.9 | 594 | 0.621 | 100 | NA | NA |
| Lane 3 | 369 | - | 369 | 6.9 | 594 | 0.621 | 100 | NA | NA |
| Lane 4 | - | 60 | 60 | 5.0 | 357 | 0.168 | 100 | 0.0 | 3 |
| Lane 5 | 17 | - | 17 | 100.0 | 376 | 0.045 | 100 | NA | NA |
| Approach | 855 | 60 | 915 | 8.5 | | 0.621 | | | |
| SouthWest: Mattson Road | | | | | | | | | |
| Mov. From SW To Exit: | L2 NW | R2 SE | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 13 | - | 13 | 7.7 | 350 | 0.037 | 100 | NA | NA |
| Lane 2 | - | 26 | 26 | 3.8 | 216 | 0.120 | 100 | NA | NA |
| Approach | 13 | 26 | 39 | 5.1 | | 0.120 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 2015 | 8.5 | 0.807 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

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

6 Lane under-utilisation due to downstream effects

**Merge Analysis (CCG)**

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site: 7.0 [7.0 William Roberts Rd / Ti Rakau Dr] | | | | | | | | | | | | |
| SouthEast Exit: Ti Rakau Drive (East) Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 4 | Merge Analysis not applied. | | | | | | | | | | |
| NorthEast Exit: William Roberts Road Extension Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| NorthWest Exit: Ti Rakau Drive (West) Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 4 | Merge Analysis not applied. | | | | | | | | | | |
| Site: 7.5 [7.5 Mattson Rd/ Ti Rakau Dr] | | | | | | | | | | | | |
| SouthEast Exit: Ti Rakau Drive (East) Merge Type: **Priority** | | | | | | | | | | | | |
| Exit Short Lane | 1 | 40 | 0.0 | 369 | 382 | 3.00 | 2.00 | 100 | 1410 | 0.071 | 0.6 | 0.7 |
| Merge Lane | 2 | - | 100.0 | Merge Lane is not Opposed | | | | 369 | 1800 | 0.205 | 0.0 | 0.0 |
| NorthWest Exit: Ti Rakau Drive (West) | | | | | | | | | | | | |

| | | |
|---|---|---|
| Merge Type: **Not Applied** | | |
| Full Length Lane | 1 | Merge Analysis not applied. |
| Full Length Lane | 2 | Merge Analysis not applied. |
| Full Length Lane | 3 | Merge Analysis not applied. |
| Full Length Lane | 4 | Merge Analysis not applied. |
| SouthWest Exit: Mattson Road<br>Merge Type: **Not Applied** | | |
| Full Length Lane | 1 | Merge Analysis not applied. |

# LANE SUMMARY

## Site: 8.1 [8.1 U-turn - West of Marriot Rd (Site Folder: PM)]

## Network: N101 [PM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated    Cycle Time = 30 seconds (Site Practical Cycle Time)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SouthEast: Ti Rakau Drive (East)** | | | | | | | | | | | | | | | |
| Lane 1 | 529 | 7.6 | 529 | 7.6 | 1849 | 0.286 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 147 | 0.0 | 0.0 |
| Lane 2 | 529 | 7.6 | 529 | 7.6 | 1849 | 0.286 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 147 | 0.0 | 0.0 |
| Lane 3 | 173 | 4.6 | 173 | 4.6 | 314 | 0.551 | 100 | 18.4 | LOS B | 2.3 | 16.5 | Short | 14 | 0.0 | NA |
| Lane 4 (B) | 13 | 100.0 | 13 | 100.0 | 438 | 0.030 | 100 | 2.9 | LOS A | 0.0 | 0.6 | Full | 147 | 0.0 | 0.0 |
| Approach | 1244 | 8.1 | 1244 | 8.1 | | 0.551 | | 2.6 | LOS A | 2.3 | 16.5 | | | | |
| **NorthWest: Ti Rakau Drive (West)** | | | | | | | | | | | | | | | |
| Lane 1 | 434 | 6.9 | 433 | 6.9 | 681 | 0.637 | 100 | 9.5 | LOS A | 5.2 | 38.3 | Full | 73 | 0.0 | 0.0 |
| Lane 2 | 434 | 6.9 | 433 | 6.9 | 681 | 0.637 | 100 | 9.5 | LOS A | 5.2 | 38.3 | Full | 73 | 0.0 | 0.0 |
| Lane 3 (B) | 17 | 100.0 | 17 | 100.0 | 438 | 0.039 | 100 | 2.9 | LOS A | 0.1 | 0.8 | Full | 73 | 0.0 | 0.0 |
| Approach | 884 | 8.7 | 884 | 8.7 | | 0.637 | | 9.4 | LOS A | 5.2 | 38.3 | | | | |
| Intersection | 2128 | 8.4 | 2128 | 8.4 | | 0.637 | | 5.4 | LOS A | 5.2 | 38.3 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

**Approach Lane Flows (veh/h)**

SouthEast: Ti Rakau Drive (East)

| Mov. From SE To Exit: | T1 NW | U SE | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 529 | - | 529 | 7.6 | 1849 | 0.286 | 100 | NA | NA |
| Lane 2 | 529 | - | 529 | 7.6 | 1849 | 0.286 | 100 | NA | NA |
| Lane 3 | - | 173 | 173 | 4.6 | 314 | 0.551 | 100 | 29.8 | 2 |
| Lane 4 | 13 | - | 13 | 100.0 | 438 | 0.030 | 100 | NA | NA |
| Approach | 1071 | 173 | 1244 | 8.1 | | 0.551 | | | |

NorthWest: Ti Rakau Drive (West)

| Mov. From NW To Exit: | T1 SE | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|
| Lane 1 | 433 | 433 | 6.9 | 681 | 0.637 | 100 | NA | NA |
| Lane 2 | 433 | 433 | 6.9 | 681 | 0.637 | 100 | NA | NA |
| Lane 3 | 17 | 17 | 100.0 | 438 | 0.039 | 100 | NA | NA |
| Approach | 884 | 884 | 8.7 | | 0.637 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 2128 | 8.4 | 0.637 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

| Merge Analysis | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast Exit: Ti Rakau Drive (East)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | | |
| NorthWest Exit: Ti Rakau Drive (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | | |

# LANE SUMMARY

## Site: 10.1 [10.1 U-turn - East of Edgewater Dr (West) (Site Folder: PM)]

## Network: N101 [PM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 30 seconds (Site Practical Cycle Time)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast: Ti Rakau Drive (East) | | | | | | | | | | | | | | | |
| Lane 1 | 572 | 7.2 | 572 | 7.2 | 741 | 0.772 | 100 | 11.7 | LOS B | 8.0 | 59.3 | Full | 64 | 0.0 | 8.1 |
| Lane 2 | 572 | 7.2 | 572 | 7.2 | 741 | 0.772 | 100 | 11.7 | LOS B | 8.0 | 59.3 | Full | 64 | 0.0 | 8.1 |
| Lane 3 (B) | 13 | 100.0 | 13 | 100.0 | 478 | 0.027 | 100 | 2.1 | LOS A | 0.0 | 0.5 | Full | 64 | 0.0 | 0.0 |
| Approach | 1157 | 8.2 | 1157 | 8.2 | | 0.772 | | 11.6 | LOS B | 8.0 | 59.3 | | | | |
| NorthWest: Ti Rakau Drive (West) | | | | | | | | | | | | | | | |
| Lane 1 | 550 | 7.7 | 550 | 7.7 | 1847 | 0.298 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 81 | 0.0 | 0.0 |
| Lane 2 | 550 | 7.7 | 550 | 7.7 | 1847 | 0.298 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 81 | 0.0 | 0.0 |
| Lane 3 | 109 | 5.5 | 109 | 5.5 | 268 | 0.407 | 100 | 18.6 | LOS B | 1.4 | 10.2 | Short | 15 | 0.0 | NA |
| Lane 4 (B) | 17 | 100.0 | 17 | 100.0 | 478 | 0.036 | 100 | 2.1 | LOS A | 0.0 | 0.6 | Full | 81 | 0.0 | 0.0 |
| Approach | 1226 | 8.8 | 1226 | 8.8 | | 0.407 | | 1.7 | LOS A | 1.4 | 10.2 | | | | |
| Intersection | 2383 | 8.5 | 2383 | 8.5 | | 0.772 | | 6.5 | LOS A | 8.0 | 59.3 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

**Approach Lane Flows (veh/h)**

SouthEast: Ti Rakau Drive (East)

| Mov. From SE To Exit: | T1 NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|
| Lane 1 | 572 | 572 | 7.2 | 741 | 0.772 | 100 | NA | NA |
| Lane 2 | 572 | 572 | 7.2 | 741 | 0.772 | 100 | NA | NA |
| Lane 3 | 13 | 13 | 100.0 | 478 | 0.027 | 100 | NA | NA |
| Approach | 1157 | 1157 | 8.2 | | 0.772 | | | |

NorthWest: Ti Rakau Drive (West)

| Mov. From NW To Exit: | T1 SE | U NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 550 | - | 550 | 7.7 | 1847 | 0.298 | 100 | NA | NA |
| Lane 2 | 550 | - | 550 | 7.7 | 1847 | 0.298 | 100 | NA | NA |
| Lane 3 | - | 109 | 109 | 5.5 | 268 | 0.407 | 100 | 0.0 | 2 |
| Lane 4 | 17 | - | 17 | 100.0 | 478 | 0.036 | 100 | NA | NA |
| Approach | 1117 | 109 | 1226 | 8.8 | | 0.407 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 2383 | 8.5 | 0.772 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

| Merge Analysis | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast Exit: Ti Rakau Drive (East)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | | |
| NorthWest Exit: Ti Rakau Drive (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | | |

# LANE SUMMARY

## Site: 13.0 [13.0 Gossamer Dr / Ti Rakau Dr Closure (Site Folder: PM)]

## Network: N101 [PM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 150 seconds (Site Practical Cycle Time)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Fremantle Place | | | | | | | | | | | | | | | |
| Lane 1 | 10 | 0.0 | 10 | 0.0 | 312 | 0.032 | 100 | 60.4 | LOS E | 0.5 | 3.8 | Short | 26 | 0.0 | NA |
| Lane 2 | 11 | 0.0 | 11 | 0.0 | 112 | 0.098 | 100 | 78.6 | LOS E | 0.7 | 4.9 | Full | 285 | 0.0 | 0.0 |
| Approach | 21 | 0.0 | 21 | 0.0 | | 0.098 | | 69.9 | LOS E | 0.7 | 4.9 | | | | |
| East: Ti Rakau Drive (East) | | | | | | | | | | | | | | | |
| Lane 1 | 1164 | 8.1 | 1164 | 8.1 | 1204 | 0.967 | 100 | 51.4 | LOS D | 84.1 | 629.2 | Full | 636 | 0.0 | 14.0 |
| Approach | 1164 | 8.1 | 1164 | 8.1 | | 0.967 | | 51.4 | LOS D | 84.1 | 629.2 | | | | |
| West: Ti Rakau Drive (West) | | | | | | | | | | | | | | | |
| Lane 1 | 1102 | 9.3 | 1102 | 9.3 | 1163 | 0.948 | 100 | 45.5 | LOS D | 78.4 | 592.7 | Full | 479 | 0.0 | 34.5 |
| Approach | 1102 | 9.3 | 1102 | 9.3 | | 0.948 | | 45.5 | LOS D | 78.4 | 592.7 | | | | |
| Intersection | 2287 | 8.6 | 2287 | 8.6 | | 0.967 | | 48.7 | LOS D | 84.1 | 629.2 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

**Approach Lane Flows (veh/h)**

South: Fremantle Place

| Mov. From S To Exit: | L2 W | R2 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 10 | - | 10 | 0.0 | 312 | 0.032 | 100 | 0.0 | 2 |
| Lane 2 | - | 11 | 11 | 0.0 | 112 | 0.098 | 100 | NA | NA |
| Approach | 10 | 11 | 21 | 0.0 | | 0.098 | | | |

East: Ti Rakau Drive (East)

| Mov. From E To Exit: | L2 S | T1 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 10 | 1154 | 1164 | 8.1 | 1204 | 0.967 | 100 | NA | NA |
| Approach | 10 | 1154 | 1164 | 8.1 | | 0.967 | | | |

West: Ti Rakau Drive (West)

| Mov. From W To Exit: | T1 E | R2 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 1085 | 17 | 1102 | 9.3 | 1163 | 0.948 | 100 | NA | NA |
| Approach | 1085 | 17 | 1102 | 9.3 | | 0.948 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| Intersection | 2287 | 8.6 | | 0.967 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

**Merge Analysis**

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | Opposing Flow Rate pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South Exit: Fremantle Place<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| East Exit: Ti Rakau Drive (East)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| West Exit: Ti Rakau Drive (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |

# Appendix J

**EB2/EB3R Final Scenario – Phasing Diagrams**

# LANE SUMMARY

## Site: 1.0 [1.0 Pakuranga Rd / Ti Rakau Dr (Site Folder: AM)]

## Network: N101 [AM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 100 seconds (Site Practical Cycle Time)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **South: Ti Rakau Drive** | | | | | | | | | | | | | | | |
| Lane 1 | 446 | 9.3 | 446 | 9.3 | 554 | 0.804 | 100 | 42.5 | LOS D | 19.4 | 146.4 | Full | 174 | 0.0 | 0.0 |
| Lane 2 | 446 | 9.3 | 446 | 9.3 | 554 | 0.804 | 100 | 42.5 | LOS D | 19.4 | 146.4 | Full | 174 | 0.0 | 0.0 |
| Lane 3 | 256 | 8.6 | 256 | 8.6 | 557 | 0.460 | 100 | 34.0 | LOS C | 9.0 | 67.5 | Short | 87 | 0.0 | NA |
| Lane 4 (B) | 53 | 100.0 | 53 | 100.0 | 263 | 0.202 | 100 | 28.3 | LOS C | 1.4 | 17.9 | Full | 174 | 0.0 | 0.0 |
| Approach | 1200 | 13.2 | 1200 | 13.2 | | 0.804 | | 40.1 | LOS D | 19.4 | 146.4 | | | | |
| **East: Pakuranga Road (East)** | | | | | | | | | | | | | | | |
| Lane 1 | 94 | 6.4 | 84 | 6.4 | 459 | 0.183 | 100 | 35.7 | LOS D | 2.9 | 21.2 | Short | 21 | 0.0 | NA |
| Lane 2 | 372 | 4.3 | 333 | 4.4 | 416[1] | 0.801 | 100 | 40.8 | LOS D | 14.3 | 104.0 | Full | 98 | 0.0 | 20.4 |
| Lane 3 | 438 | 4.3 | 393 | 4.4 | 490 | 0.801 | 100 | 41.5 | LOS D | 17.3 | 126.0 | Full | 98 | 0.0 | 38.0 |
| Approach | 904 | 4.5 | 810[N1] | 4.6 | | 0.801 | | 40.6 | LOS D | 17.3 | 126.0 | | | | |
| **West: Pakuranga Road (West)** | | | | | | | | | | | | | | | |
| Lane 1 (B) | 23 | 100.0 | 23 | 100.0 | 263 | 0.087 | 100 | 27.4 | LOS C | 0.6 | 7.3 | Full | 380 | 0.0 | 0.0 |
| Lane 2 | 296 | 5.7 | 296 | 5.7 | 486 | 0.609 | 100 | 35.5 | LOS D | 11.5 | 84.6 | Full | 380 | 0.0 | 0.0 |
| Lane 3 | 296 | 5.7 | 296 | 5.7 | 486 | 0.609 | 100 | 35.5 | LOS D | 11.5 | 84.6 | Full | 380 | 0.0 | 0.0 |
| Lane 4 | 319 | 17.9 | 319 | 17.9 | 393 | 0.810 | 100 | 49.1 | LOS D | 14.6 | 117.6 | Short | 178 | 0.0 | NA |
| Lane 5 | 319 | 17.9 | 319 | 17.9 | 393 | 0.810 | 100 | 49.1 | LOS D | 14.6 | 117.6 | Short | 105 | 0.0 | NA |
| Approach | 1252 | 13.7 | 1252 | 13.7 | | 0.810 | | 42.3 | LOS D | 14.6 | 117.6 | | | | |
| Intersection | 3356 | 11.0 | 3262[N1] | 11.3 | | 0.810 | | 41.0 | LOS D | 19.4 | 146.4 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

**Approach Lane Flows (veh/h)**

South: Ti Rakau Drive

| Mov. From S To Exit: | L2 W | R2 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 446 | - | 446 | 9.3 | 554 | 0.804 | 100 | NA | NA |
| Lane 2 | 446 | - | 446 | 9.3 | 554 | 0.804 | 100 | NA | NA |
| Lane 3 | - | 256 | 256 | 8.6 | 557 | 0.460 | 100 | 0.0 | 2 |
| Lane 4 | 53 | - | 53 | 100.0 | 263 | 0.202 | 100 | NA | NA |
| Approach | 944 | 256 | 1200 | 13.2 | | 0.804 | | | |

East: Pakuranga Road (East)

| Mov. | L2 | T1 | Total | %HV | Deg. | Lane | Prob. | Ov. |
|---|---|---|---|---|---|---|---|---|

| From E<br>To Exit: | S | W | | | Cap.<br>veh/h | Satn<br>v/c | Util.<br>% | SL Ov.<br>% | Lane<br>No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 84 | - | 84 | 6.4 | 459 | 0.183 | 100 | 16.0 | 2 |
| Lane 2 | - | 333 | 333 | 4.4 | 416[1] | 0.801 | 100 | NA | NA |
| Lane 3 | - | 393 | 393 | 4.4 | 490 | 0.801 | 100 | NA | NA |
| Approach | 84 | 725 | 810 | 4.6 | | 0.801 | | | |

West: Pakuranga Road (West)

| Mov.<br>From W<br>To Exit: | T1<br>E | R2<br>S | Total | %HV | Cap.<br>veh/h | Deg.<br>Satn<br>v/c | Lane<br>Util.<br>% | Prob.<br>SL Ov.<br>% | Ov.<br>Lane<br>No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | - | 23 | 23 | 100.0 | 263 | 0.087 | 100 | NA | NA |
| Lane 2 | 296 | - | 296 | 5.7 | 486 | 0.609 | 100 | NA | NA |
| Lane 3 | 296 | - | 296 | 5.7 | 486 | 0.609 | 100 | NA | NA |
| Lane 4 | - | 319 | 319 | 17.9 | 393 | 0.810 | 100 | 0.0 | 3 |
| Lane 5 | - | 319 | 319 | 17.9 | 393 | 0.810 | 100 | 25.4 | 4 |
| Approach | 592 | 660 | 1252 | 13.7 | | 0.810 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 3262 | 11.3 | 0.810 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

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

## Merge Analysis

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South Exit: Ti Rakau Drive<br>Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | |
| East Exit: Pakuranga Road (East)<br>Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | |
| West Exit: Pakuranga Road (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | |

# LANE SUMMARY

## Site: 8.1 [8.1 U-turn - West of Marriot Rd (Site Folder: AM)]

**Network: N101 [AM (Network Folder: General)]**

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated    Cycle Time = 30 seconds (Site Practical Cycle Time)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SouthEast: Ti Rakau Drive (East)** | | | | | | | | | | | | | | | |
| Lane 1 | 780 | 11.0 | 780 | 11.0 | 1810 | 0.431 | 100 | 0.1 | LOS A | 0.0 | 0.0 | Full | 147 | 0.0 | 0.0 |
| Lane 2 | 780 | 11.0 | 780 | 11.0 | 1810 | 0.431 | 100 | 0.1 | LOS A | 0.0 | 0.0 | Full | 147 | 0.0 | 0.0 |
| Lane 3 | 68 | 5.9 | 68 | 5.9 | 267 | 0.255 | 100 | 18.2 | LOS B | 0.8 | 6.2 | Short | 14 | 0.0 | NA |
| Lane 4 (B) | 25 | 100.0 | 25 | 100.0 | 478 | 0.052 | 100 | 2.1 | LOS A | 0.1 | 0.9 | Full | 147 | 0.0 | 0.0 |
| Approach | 1652 | 12.2 | 1652 | 12.2 | | 0.431 | | 0.8 | LOS A | 0.8 | 6.2 | | | | |
| **NorthWest: Ti Rakau Drive (West)** | | | | | | | | | | | | | | | |
| Lane 1 | 533 | 14.2 | 533 | 14.2 | 711 | 0.750 | 100 | 11.1 | LOS B | 7.2 | 56.7 | Full | 73 | 0.0 | 0.0 |
| Lane 2 | 533 | 14.2 | 533 | 14.2 | 711 | 0.750 | 100 | 11.1 | LOS B | 7.2 | 56.7 | Full | 73 | 0.0 | 0.0 |
| Lane 3 (B) | 13 | 100.0 | 13 | 100.0 | 478 | 0.027 | 100 | 2.1 | LOS A | 0.0 | 0.5 | Full | 73 | 0.0 | 0.0 |
| Approach | 1079 | 15.2 | 1079 | 15.2 | | 0.750 | | 11.0 | LOS B | 7.2 | 56.7 | | | | |
| Intersection | 2731 | 13.4 | 2731 | 13.4 | | 0.750 | | 4.8 | LOS A | 7.2 | 56.7 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

**Approach Lane Flows (veh/h)**

SouthEast: Ti Rakau Drive (East)

| Mov. From SE To Exit: | T1 NW | U SE | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 780 | - | 780 | 11.0 | 1810 | 0.431 | 100 | NA | NA |
| Lane 2 | 780 | - | 780 | 11.0 | 1810 | 0.431 | 100 | NA | NA |
| Lane 3 | - | 68 | 68 | 5.9 | 267 | 0.255 | 100 | 0.0 | 2 |
| Lane 4 | 25 | - | 25 | 100.0 | 478 | 0.052 | 100 | NA | NA |
| Approach | 1584 | 68 | 1652 | 12.2 | | 0.431 | | | |

NorthWest: Ti Rakau Drive (West)

| Mov. From NW To Exit: | T1 SE | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|
| Lane 1 | 533 | 533 | 14.2 | 711 | 0.750 | 100 | NA | NA |
| Lane 2 | 533 | 533 | 14.2 | 711 | 0.750 | 100 | NA | NA |
| Lane 3 | 13 | 13 | 100.0 | 478 | 0.027 | 100 | NA | NA |
| Approach | 1079 | 1079 | 15.2 | | 0.750 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 2731 | 13.4 | 0.750 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

## Merge Analysis

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast Exit: Ti Rakau Drive (East)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | | |
| NorthWest Exit: Ti Rakau Drive (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | | |

# LANE SUMMARY

## Site: 10.1 [10.1 U-turn - East of Edgewater Dr (West) (Site Folder: AM)]

## Network: N101 [AM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 40 seconds (Site Practical Cycle Time)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast: Ti Rakau Drive (East) | | | | | | | | | | | | | | | |
| Lane 1 | 771 | 10.7 | 771 | 10.7 | 998 | 0.773 | 100 | 10.6 | LOS B | 12.2 N4 | 93.5 N4 | Full | 64 | 0.0 | 50.0 |
| Lane 2 | 771 | 10.7 | 771 | 10.7 | 998 | 0.773 | 100 | 10.6 | LOS B | 12.2 N4 | 93.5 N4 | Full | 64 | 0.0 | 50.0 |
| Lane 3 (B) | 25 | 100.0 | 25 | 100.0 | 657 | 0.038 | 100 | 0.2 | LOS A | 0.0 | 0.1 | Full | 64 | 0.0 | 0.0 |
| Approach | 1567 | 12.1 | 1567 | 12.1 | | 0.773 | | 10.5 | LOS B | 12.2 | 93.5 | | | | |
| NorthWest: Ti Rakau Drive (West) | | | | | | | | | | | | | | | |
| Lane 1 | 537 | 13.6 | 537 | 13.6 | 1783 | 0.302 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 81 | 0.0 | 0.0 |
| Lane 2 | 538 | 13.6 | 538 | 13.6 | 1783 | 0.302 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 81 | 0.0 | 0.0 |
| Lane 3 | 112 | 10.7 | 112 | 10.7 | 194 | 0.576 | 100 | 25.6 | LOS C | 2.1 | 16.0 | Short | 15 | 0.0 | NA |
| Lane 4 (B) | 13 | 100.0 | 13 | 100.0 | 657 | 0.020 | 100 | 0.2 | LOS A | 0.0 | 0.1 | Full | 81 | 0.0 | 0.0 |
| Approach | 1200 | 14.3 | 1200 | 14.3 | | 0.576 | | 2.4 | LOS A | 2.1 | 16.0 | | | | |
| Intersection | 2767 | 13.0 | 2767 | 13.0 | | 0.773 | | 7.0 | LOS A | 12.2 | 93.5 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N4 Average back of queue has been restricted to the available queue storage space.

**Approach Lane Flows (veh/h)**

SouthEast: Ti Rakau Drive (East)

| Mov. From SE To Exit: | T1 NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|
| Lane 1 | 771 | 771 | 10.7 | 998 | 0.773 | 100 | NA | NA |
| Lane 2 | 771 | 771 | 10.7 | 998 | 0.773 | 100 | NA | NA |
| Lane 3 | 25 | 25 | 100.0 | 657 | 0.038 | 100 | NA | NA |
| Approach | 1567 | 1567 | 12.1 | | 0.773 | | | |

NorthWest: Ti Rakau Drive (West)

| Mov. From NW To Exit: | T1 SE | U NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 537 | - | 537 | 13.6 | 1783 | 0.302 | 100 | NA | NA |
| Lane 2 | 538 | - | 538 | 13.6 | 1783 | 0.302 | 100 | NA | NA |
| Lane 3 | - | 112 | 112 | 10.7 | 194 | 0.576 | 100 | 20.7 | 2 |
| Lane 4 | 13 | - | 13 | 100.0 | 657 | 0.020 | 100 | NA | NA |
| Approach | 1088 | 112 | 1200 | 14.3 | | 0.576 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 2767 | 13.0 | 0.773 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

| Merge Analysis | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Exit Lane Number | Short Lane Length | Percent Opng in Lane | Opposing Flow Rate | | Critical Gap | Follow-up Headway | Lane Flow Rate | Capacity | Deg. Satn | Min. Delay | Merge Delay |
| | | m | % | veh/h | pcu/h | sec | sec | veh/h | veh/h | v/c | sec | sec |
| SouthEast Exit: Ti Rakau Drive (East)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | | |
| NorthWest Exit: Ti Rakau Drive (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | | |

# LANE SUMMARY

## Site: 13.0 [13.0 Gossamer Dr / Ti Rakau Dr (Site Folder: AM)]

Network: N101 [AM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated    Cycle Time = 150 seconds (Site User-Given Phase Times)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **South: Fremantle Place** | | | | | | | | | | | | | | | |
| Lane 1 | 20 | 10.0 | 20 | 10.0 | 93 | 0.215 | 100 | 81.5 | LOS F | 1.3 | 10.0 | Short | 9 | 0.0 | NA |
| Lane 2 | 21 | 4.8 | 21 | 4.8 | 98 | 0.213 | 100 | 79.0 | LOS E | 1.4 | 10.0 | Full | 285 | 0.0 | 0.0 |
| Approach | 41 | 7.3 | 41 | 7.3 | | 0.215 | | 80.2 | LOS F | 1.4 | 10.0 | | | | |
| **East: Ti Rakau Drive (East)** | | | | | | | | | | | | | | | |
| Lane 1 | 769 | 10.6 | 769 | 10.6 | 796 | 0.967 | 100 | 77.1 | LOS E | 63.7 | 486.1 | Full | 636 | 0.0 | 0.0 |
| Lane 2 | 739 | 10.8 | 739 | 10.8 | 764 [1] | 0.967 | 100 | 76.8 | LOS E | 60.1 | 459.5 | Full | 636 | 0.0 | 0.0 |
| Lane 3 (B) | 28 | 100.0 | 28 | 100.0 | 204 | 0.137 | 100 | 34.7 | LOS C | 1.2 | 15.0 | Short | 60 | 0.0 | NA |
| Lane 4 | 172 | 8.4 | 172 | 8.4 | 244 | 0.705 | 82 [6] | 73.4 | LOS E | 11.1 | 83.6 | Short | 150 | 0.0 | NA |
| Lane 5 | 210 | 8.4 | 210 | 8.4 | 244 | 0.860 | 100 | 82.5 | LOS F | 14.9 | 111.9 | Short | 103 | 0.0 | NA |
| Approach | 1918 | 11.5 | 1918 | 11.5 | | 0.967 | | 76.6 | LOS E | 63.7 | 486.1 | | | | |
| **North: Gossamer Drive** | | | | | | | | | | | | | | | |
| Lane 1 | 359 | 9.5 | 359 | 9.5 | 365 | 0.982 | 100 | 101.3 | LOS F | 24.8 | 187.8 | Short | 150 | 0.0 | NA |
| Lane 2 | 358 | 9.5 | 358 | 9.5 | 365 [1] | 0.982 | 100 | 101.0 | LOS F | 24.8 | 187.6 | Full | 1010 | 0.0 | 0.0 |
| Lane 3 | 41 | 14.6 | 41 | 14.6 | 124 | 0.330 | 100 | 77.5 | LOS E | 2.7 | 20.9 | Short | 28 | 0.0 | NA |
| Approach | 758 | 9.8 | 758 | 9.8 | | 0.982 | | 99.9 | LOS F | 24.8 | 187.8 | | | | |
| **West: Ti Rakau Drive (West)** | | | | | | | | | | | | | | | |
| Lane 1 | 31 | 6.5 | 31 | 6.5 | 718 | 0.043 | 100 | 32.9 | LOS C | 1.2 | 8.8 | Short | 28 | 0.0 | NA |
| Lane 2 | 505 | 13.7 | 505 | 13.7 | 542 [1] | 0.932 | 100 | 74.5 | LOS E | 38.4 | 300.7 | Full | 479 | 0.0 | 0.0 |
| Lane 3 | 473 | 13.7 | 473 | 13.7 | 507 [1] | 0.932 | 100 | 74.4 | LOS E | 35.5 | 277.5 | Full | 479 | 0.0 | 0.0 |
| Lane 4 | 53 | 7.5 | 53 | 7.5 | 194 | 0.274 | 100 | 69.3 | LOS E | 3.2 | 23.7 | Short | 23 | 0.0 | NA |
| Lane 5 (B) | 27 | 100.0 | 27 | 100.0 | 207 | 0.130 | 100 | 34.6 | LOS C | 1.1 | 14.4 | Full | 479 | 0.0 | 0.0 |
| Approach | 1089 | 15.3 | 1089 | 15.3 | | 0.932 | | 72.0 | LOS E | 38.4 | 300.7 | | | | |
| Intersection | 3806 | 12.2 | 3806 | 12.2 | | 0.982 | | 80.0 | LOS E | 63.7 | 486.1 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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

**Approach Lane Flows (veh/h)**

South: Fremantle Place

| Mov. From S To Exit: | L2 W | T1 N | R2 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 20 | - | - | 20 | 10.0 | 93 | 0.215 | 100 | 24.7 | 2 |
| Lane 2 | - | 10 | 11 | 21 | 4.8 | 98 | 0.213 | 100 | NA | NA |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | 20 | 10 | 11 | 41 | 7.3 | | 0.215 | | | | |

East: Ti Rakau Drive (East)

| Mov. From E To Exit: | L2 S | T1 W | R2 N | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 15 | 754 | - | 769 | 10.6 | 796 | 0.967 | 100 | NA | NA |
| Lane 2 | - | 739 | - | 739 | 10.8 | 764 [1] | 0.967 | 100 | NA | NA |
| Lane 3 | - | 28 | - | 28 | 100.0 | 204 | 0.137 | 100 | 0.0 | 2 |
| Lane 4 | - | - | 172 | 172 | 8.4 | 244 | 0.705 | 82 [6] | 0.0 | 2 |
| Lane 5 | - | - | 210 | 210 | 8.4 | 244 | 0.860 | 100 | 22.5 | 4 |
| Approach | 15 | 1521 | 382 | 1918 | 11.5 | | 0.967 | | | |

North: Gossamer Drive

| Mov. From N To Exit: | L2 E | T1 S | R2 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 359 | - | - | 359 | 9.5 | 365 | 0.982 | 100 | 35.6 | 2 |
| Lane 2 | 358 | - | - | 358 | 9.5 | 365 [1] | 0.982 | 100 | NA | NA |
| Lane 3 | - | 10 | 31 | 41 | 14.6 | 124 | 0.330 | 100 | 0.0 | 2 |
| Approach | 717 | 10 | 31 | 758 | 9.8 | | 0.982 | | | |

West: Ti Rakau Drive (West)

| Mov. From W To Exit: | L2 N | T1 E | R2 S | U W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 31 | - | - | - | 31 | 6.5 | 718 | 0.043 | 100 | 0.0 | 2 |
| Lane 2 | - | 505 | - | - | 505 | 13.7 | 542 [1] | 0.932 | 100 | NA | NA |
| Lane 3 | - | 473 | - | - | 473 | 13.7 | 507 [1] | 0.932 | 100 | NA | NA |
| Lane 4 | - | - | 10 | 43 | 53 | 7.5 | 194 | 0.274 | 100 | 17.7 | 3 |
| Lane 5 | - | 27 | - | - | 27 | 100.0 | 207 | 0.130 | 100 | NA | NA |
| Approach | 31 | 1005 | 10 | 43 | 1089 | 15.3 | | 0.932 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 3806 | 12.2 | 0.982 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

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

6 Lane under-utilisation due to downstream effects

**Merge Analysis**

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | Opposing Flow Rate pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South Exit: Fremantle Place<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| East Exit: Ti Rakau Drive (East)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| North Exit: Gossamer Drive<br>Merge Type: **Zipper** | | | | | | | | | | | | |
| Exit Short Lane | 1 | 150 | 50.0 | 105 | 109 | 2.50 | 2.00 | 213 | 1675 | 0.127 | 0.0 | 0.0 |
| Merge Lane | 2 | - | 50.0 | 107 | 111 | 2.50 | 2.00 | 210 | 1674 | 0.125 | 0.0 | 0.0 |
| West Exit: Ti Rakau Drive (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |

| | | |
|---|---|---|
| Full Length Lane | 1 | Merge Analysis not applied. |
| Full Length Lane | 2 | Merge Analysis not applied. |
| Full Length Lane | 3 | Merge Analysis not applied. |

# LANE SUMMARY

## Site: 2.1 [2.1 Pakuranga Plaza / Pakuranga Rd (Site Folder: AM)]

## Network: N101 [AM (Network Folder: General)]

Site Category: (None)
Give-Way (Two-Way)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **East: Pakuranga Road (East)** | | | | | | | | | | | | | | | |
| Lane 1 | 479 | 4.5 | 428 | 4.6 | 1879 | 0.227 | 100 | 0.6 | LOS A | 0.0 | 0.0 | Full | 121 | 0.0 | 0.0 |
| Lane 2 | 480 | 4.7 | 428 | 4.7 | 1882 | 0.227 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 121 | 0.0 | 0.0 |
| Approach | 959 | 4.6 | 856 N1 | 4.6 | | 0.227 | | 0.3 | NA | 0.0 | 0.0 | | | | |
| **West: Pakuranga Road (West)** | | | | | | | | | | | | | | | |
| Lane 1 | 521 | 6.9 | 521 | 6.9 | 1856 | 0.281 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 108 | 0.0 | 0.0 |
| Lane 2 | 347 | 6.9 | 347 | 6.9 | 1238 | 0.281 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 108 | -33.3 N3 | 0.0 |
| Approach | 868 | 6.9 | 868 | 6.9 | | 0.281 | | 0.0 | NA | 0.0 | 0.0 | | | | |
| **SouthWest: Pakuranga Plaza** | | | | | | | | | | | | | | | |
| Lane 1 | 46 | 4.3 | 46 | 4.3 | 87 | 0.527 | 100 | 48.9 | LOS E | 1.1 | 7.7 | Full | 196 | -27.0 N7 | 0.0 |
| Approach | 46 | 4.3 | 46 | 4.3 | | 0.527 | | 48.9 | LOS E | 1.1 | 7.7 | | | | |
| Intersection | 1873 | 5.7 | 1770 N1 | 6.0 | | 0.527 | | 1.4 | NA | 1.1 | 7.7 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.
N3 Capacity Adjustment due to downstream lane blockage determined by the program.
N7 The capacity reduction has been determined from the queue blockage probability of a Site further downstream due to intermediate continuous lanes.

**Approach Lane Flows (veh/h)**

East: Pakuranga Road (East)

| Mov. From E To Exit: | L1 SW | T1 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 52 | 376 | 428 | 4.6 | 1879 | 0.227 | 100 | NA | NA |
| Lane 2 | - | 428 | 428 | 4.7 | 1882 | 0.227 | 100 | NA | NA |
| Approach | 52 | 804 | 856 | 4.6 | | 0.227 | | | |

West: Pakuranga Road (West)

| Mov. From W To Exit: | T1 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|
| Lane 1 | 521 | 521 | 6.9 | 1856 | 0.281 | 100 | NA | NA |
| Lane 2 | 347 | 347 | 6.9 | 1238 | 0.281 | 100 | NA | NA |
| Approach | 868 | 868 | 6.9 | | 0.281 | | | |

SouthWest: Pakuranga Plaza

| Mov. From SW To Exit: | L3 W | R1 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 12 | 34 | 46 | 4.3 | 87 | 0.527 | 100 | NA | NA |
| Approach | 12 | 34 | 46 | 4.3 | | 0.527 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 1770 | 6.0 | 0.527 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

**Merge Analysis**

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| East Exit: Pakuranga Road (East)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| West Exit: Pakuranga Road (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| SouthWest Exit: Pakuranga Plaza<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |

# LANE SUMMARY

## Site: 3.0 [3.0 Pakuranga Highway / Pakuranga Rd (Site Folder: AM)]

## Network: N101 [AM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated    Cycle Time = 150 seconds (Site User-Given Phase Times)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **East: Pakuranga Road (East)** | | | | | | | | | | | | | | | |
| Lane 1 (B) | 28 | 100.0 | 28 | 100.0 | 665 | 0.042 | 100 | 17.8 | LOS B | 0.7 | 9.4 | Short | 24 | 0.0 | NA |
| Lane 2 | 1057 | 5.1 | 1057 | 5.1 | 1070 [1] | 0.988 | 100 | 74.8 | LOS E | 88.2 | 644.3 | Full | 183 | 0.0 | 100.0 |
| Lane 3 | 1100 | 5.1 | 1100 | 5.1 | 1114 | 0.988 | 100 | 75.0 | LOS E | 94.9 | 693.1 | Full | 183 | 0.0 | 100.0 |
| Lane 4 | 428 | 4.3 | 428 | 4.3 | 376 [1] | 1.138 | 100 | 212.5 | LOS F | 54.4 | 394.9 | Full | 183 | 0.0 | 87.5 [8] |
| Lane 5 | 428 | 4.3 | 428 | 4.3 | 376 [1] | 1.138 | 100 | 212.5 | LOS F | 54.4 | 394.9 | Short | 60 | 0.0 | NA |
| Approach | 3041 | 5.8 | 3041 | 5.8 | | 1.138 | | 113.1 | LOS F | 94.9 | 693.1 | | | | |
| **NorthWest: Pakuranga Road (West)** | | | | | | | | | | | | | | | |
| Lane 1 | 313 | 5.6 | 313 | 5.6 | 708 | 0.442 | 100 | 26.4 | LOS C | 11.5 | 84.1 | Full | 121 | 0.0 | 0.0 |
| Lane 2 | 313 | 5.6 | 313 | 5.6 | 708 | 0.442 | 100 | 26.4 | LOS C | 11.5 | 84.1 | Full | 121 | 0.0 | 33.3 [8] |
| Lane 3 | 288 | 9.4 | 288 | 9.4 | 346 | 0.832 | 100 | 73.3 | LOS E | 19.5 | 147.8 | Short | 98 | 0.0 | NA |
| Approach | 913 | 6.8 | 913 | 6.8 | | 0.832 | | 41.1 | LOS D | 19.5 | 147.8 | | | | |
| **West: Pakuranga Road Busway Link (Northbound)** | | | | | | | | | | | | | | | |
| Lane 1 (B) | 9 | 100.0 | 9 | 100.0 | 454 | 0.020 | 100 | 30.7 | LOS C | 0.4 | 4.7 | Full | 215 | 0.0 | 0.0 |
| Approach | 9 | 100.0 | 9 | 100.0 | | 0.020 | | 30.7 | LOS C | 0.4 | 4.7 | | | | |
| **SouthWest: Flyover** | | | | | | | | | | | | | | | |
| Lane 1 | 108 | 7.4 | 108 | 7.4 | 362 | 0.298 | 100 | 60.6 | LOS E | 6.0 | 44.9 | Short | 70 | 0.0 | NA |
| Lane 2 | 388 | 4.9 | 388 | 4.9 | 644 [1] | 0.603 | 100 | 42.9 | LOS D | 19.6 | 142.7 | Full | 1162 | 0.0 | 0.0 |
| Lane 3 | 435 | 4.9 | 435 | 4.9 | 721 | 0.603 | 100 | 44.1 | LOS D | 22.6 | 165.1 | Full | 1162 | 0.0 | 0.0 |
| Approach | 931 | 5.2 | 931 | 5.2 | | 0.603 | | 45.5 | LOS D | 22.6 | 165.1 | | | | |
| Intersection | 4894 | 6.0 | 4894 | 6.0 | | 1.138 | | 86.7 | LOS F | 94.9 | 693.1 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
8 Probability of Blockage has been set on the basis of a queue that overflows from a short lane.

**Approach Lane Flows (veh/h)**

East: Pakuranga Road (East)

| Mov. From E To Exit: | L2 S | L1 SW | R1 NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 28 | - | - | 28 | 100.0 | 665 | 0.042 | 100 | 0.0 | 2 |
| Lane 2 | - | 1057 | - | 1057 | 5.1 | 1070 [1] | 0.988 | 100 | NA | NA |
| Lane 3 | - | 1100 | - | 1100 | 5.1 | 1114 | 0.988 | 100 | NA | NA |
| Lane 4 | - | - | 428 | 428 | 4.3 | 376 [1] | 1.138 | 100 | NA | NA |
| Lane 5 | - | - | 428 | 428 | 4.3 | 376 [1] | 1.138 | 100 | 100.0 | 4 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Approach | 28 | 2157 | 856 | 3041 | 5.8 | | 1.138 | | | |

**NorthWest: Pakuranga Road (West)**

| Mov. From NW To Exit: | L1 E | R2 SW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 313 | - | 313 | 5.6 | 708 | 0.442 | 100 | NA | NA |
| Lane 2 | 313 | - | 313 | 5.6 | 708 | 0.442 | 100 | NA | NA |
| Lane 3 | - | 288 | 288 | 9.4 | 346 | 0.832 | 100 | 53.0 | 2 |
| Approach | 625 | 288 | 913 | 6.8 | | 0.832 | | | |

**West: Pakuranga Road Busway Link (Northbound)**

| Mov. From W To Exit: | T1 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|
| Lane 1 | 9 | 9 | 100.0 | 454 | 0.020 | 100 | NA | NA |
| Approach | 9 | 9 | 100.0 | | 0.020 | | | |

**SouthWest: Flyover**

| Mov. From SW To Exit: | L2 NW | R1 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 108 | - | 108 | 7.4 | 362 | 0.298 | 100 | 0.0 | 2 |
| Lane 2 | - | 388 | 388 | 4.9 | 644[1] | 0.603 | 100 | NA | NA |
| Lane 3 | - | 435 | 435 | 4.9 | 721 | 0.603 | 100 | NA | NA |
| Approach | 108 | 823 | 931 | 5.2 | | 0.603 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 4894 | 6.0 | 1.138 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

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

**Merge Analysis**

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **South Exit: Pakuranga Road Busway Link (Southbound)** Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| **East Exit: Pakuranga Road (East)** Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | |
| **NorthWest Exit: Pakuranga Road (West)** Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | |
| **SouthWest Exit: Flyover** Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | |

# LANE SUMMARY

## Site: 4.0 [4.0 Palm Ave / Aylesbury St (Site Folder: AM)]

Network: N101 [AM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 144 seconds (Site User-Given Phase Times)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **South: Ti Rakau Drive (East)** | | | | | | | | | | | | | | | |
| Lane 1 | 515 | 9.2 | 515 | 9.2 | 560 | 0.919 | 100 | 74.2 | LOS E | 21.3 N4 | 160.7 N4 | Full | 110 | 0.0 | 50.0 |
| Lane 2 | 565 | 9.3 | 565 | 9.3 | 615 1 | 0.919 | 100 | 65.4 | LOS E | 21.3 N4 | 160.7 N4 | Full | 110 | 0.0 | 50.0 |
| Lane 3 | 33 | 6.1 | 33 | 6.1 | 135 | 0.244 | 100 | 74.4 | LOS E | 2.0 | 14.9 | Short | 86 | 0.0 | NA |
| Lane 4 (B) | 53 | 100.0 | 53 | 100.0 | 506 | 0.105 | 100 | 3.9 | LOS A | 0.4 | 4.6 | Full | 110 | 0.0 | 0.0 |
| Approach | 1166 | 13.3 | 1166 | 13.3 | | 0.919 | | 66.8 | LOS E | 21.3 | 160.7 | | | | |
| **East: Aylesbury Street** | | | | | | | | | | | | | | | |
| Lane 1 | 76 | 9.2 | 76 | 9.2 | 115 | 0.658 | 100 | 76.5 | LOS E | 5.0 | 37.5 | Short | 30 | -10.5 N3 | NA |
| Lane 2 | 137 | 9.5 | 137 | 9.5 | 184 1 | 0.746 | 100 | 70.2 | LOS E | 7.7 N4 | 58.4 N4 | Full | 40 | 0.0 | 50.0 |
| Approach | 213 | 9.4 | 213 | 9.4 | | 0.746 | | 72.5 | LOS E | 7.7 | 58.4 | | | | |
| **North: Ti Rakau Drive (West)** | | | | | | | | | | | | | | | |
| Lane 1 (B) | 23 | 100.0 | 23 | 100.0 | 506 | 0.045 | 100 | 3.8 | LOS A | 0.1 | 1.9 | Full | 174 | 0.0 | 0.0 |
| Lane 2 | 148 | 17.6 | 146 | 17.7 | 205 | 0.712 | 100 | 73.3 | LOS E | 9.3 | 74.7 | Short | 100 | 0.0 | NA |
| Lane 3 | 290 | 16.5 | 286 | 16.7 | 544 | 0.526 | 100 | 40.3 | LOS D | 14.3 | 114.5 | Full | 174 | -10.5 N3 | 0.0 |
| Lane 4 | 278 | 16.5 | 274 | 16.7 | 522 1 | 0.526 | 100 | 39.9 | LOS D | 13.6 | 108.9 | Full | 174 | -10.5 N3 | 0.0 |
| Lane 5 | 15 | 0.0 | 15 | 0.0 | 141 | 0.105 | 100 | 72.9 | LOS E | 0.9 | 6.2 | Short | 14 | 0.0 | NA |
| Approach | 754 | 19.0 | 744 N1 | 19.1 | | 0.712 | | 46.1 | LOS D | 14.3 | 114.5 | | | | |
| **West: Palm Avenue** | | | | | | | | | | | | | | | |
| Lane 1 | 120 | 4.2 | 120 | 4.2 | 313 | 0.384 | 100 | 60.8 | LOS E | 6.7 | 48.6 | Full | 87 | -4.0 N7 | 0.0 |
| Approach | 120 | 4.2 | 120 | 4.2 | | 0.384 | | 60.8 | LOS E | 6.7 | 48.6 | | | | |
| Intersection | 2253 | 14.3 | 2243 N1 | 14.4 | | 0.919 | | 60.1 | LOS E | 21.3 | 160.7 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.
N3 Capacity Adjustment due to downstream lane blockage determined by the program.
N4 Average back of queue has been restricted to the available queue storage space.
N7 The capacity reduction has been determined from the queue blockage probability of a Site further downstream due to intermediate continuous lanes.

**Approach Lane Flows (veh/h)**

South: Ti Rakau Drive (East)

| Mov. From S To Exit: | L2 W | T1 N | R2 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 120 | 395 | - | 515 | 9.2 | 560 | 0.919 | 100 | NA | NA |
| Lane 2 | - | 565 | - | 565 | 9.3 | 615 1 | 0.919 | 100 | NA | NA |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 3 | - | - | 33 | 33 | 6.1 | 135 | 0.244 | 100 | 0.0 | 2 |
| Lane 4 | - | 53 | - | 53 | 100.0 | 506 | 0.105 | 100 | NA | NA |
| Approach | 120 | 1013 | 33 | 1166 | 13.3 | | 0.919 | | | |

East: Aylesbury Street

| Mov. From E To Exit: | L2 S | T1 W | R2 N | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 76 | - | - | 76 | 9.2 | 115 | 0.658 | 100 | 35.5 | 2 |
| Lane 2 | - | 10 | 127 | 137 | 9.5 | 184 [1] | 0.746 | 100 | NA | NA |
| Approach | 76 | 10 | 127 | 213 | 9.4 | | 0.746 | | | |

North: Ti Rakau Drive (West)

| Mov. From N To Exit: | L2 E | T1 S | R2 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | - | 23 | - | 23 | 100.0 | 506 | 0.045 | 100 | NA | NA |
| Lane 2 | 146 | - | - | 146 | 17.7 | 205 | 0.712 | 100 | 0.0 | 3 |
| Lane 3 | - | 286 | - | 286 | 16.7 | 544 | 0.526 | 100 | NA | NA |
| Lane 4 | - | 274 | - | 274 | 16.7 | 522 [1] | 0.526 | 100 | NA | NA |
| Lane 5 | - | - | 15 | 15 | 0.0 | 141 | 0.105 | 100 | 0.0 | 4 |
| Approach | 146 | 583 | 15 | 744 | 19.1 | | 0.712 | | | |

West: Palm Avenue

| Mov. From W To Exit: | L2 N | T1 E | R2 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 51 | 27 | 42 | 120 | 4.2 | 313 | 0.384 | 100 | NA | NA |
| Approach | 51 | 27 | 42 | 120 | 4.2 | | 0.384 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 2243 | 14.4 | 0.919 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

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

## Merge Analysis

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South Exit: Ti Rakau Drive (East) Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | |
| East Exit: Aylesbury Street Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| North Exit: Ti Rakau Drive (West) Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | |
| West Exit: Palm Avenue Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |

# LANE SUMMARY

## Site: 5.0 [5.0 Pakuranga Highway / Reeves Rd (Site Folder: AM)]

## Network: N101 [AM (Network Folder: General)]

Site Category: (None)
Single Point Interchange (Signals) - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 146 seconds (Site User-Given Phase Times)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total | HV ] | ARRIVAL FLOWS [ Total | HV ] | Cap. | Deg. Satn | Lane Util. | Aver. Delay | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] | Lane Config | Lane Length | Cap. Adj. | Prob. Block. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | veh/h | % | veh/h | % | veh/h | v/c | % | sec | | | m | | m | % | % |
| **SouthEast: Ti Rakau Drive (East)** | | | | | | | | | | | | | | | |
| Lane 1 | 404 | 12.8 | 404 | 12.8 | 1229 | 0.328 | 100 | 12.3 | LOS B | 9.0 | 70.1 | Short | 50 | 0.0 | NA |
| Lane 2 | 404 | 12.8 | 404 | 12.8 | 1229 | 0.328 | 100 | 12.3 | LOS B | 9.0 | 70.1 | Full | 90 | 0.0 | 0.0 |
| Lane 3 | 474 | 9.1 | 474 | 9.1 | 464 | 1.020 | 100 | 121.3 | LOS F | 17.4 N4 | 131.5 N4 | Full | 90 | -50.0 N3 | 50.0 |
| Lane 4 | 474 | 9.1 | 474 | 9.1 | 464 | 1.020 | 100 | 121.3 | LOS F | 17.4 N6 | 131.5 N6 | Full | 90 | -50.0 N3 | 50.0 |
| Lane 5 (B) | 25 | 100.0 | 25 | 100.0 | 155 | 0.161 | 100 | 32.9 | LOS C | 0.8 | 10.1 | Full | 90 | 0.0 | 0.0 |
| Approach | 1779 | 12.0 | 1779 | 12.0 | | 1.020 | | 70.6 | LOS E | 17.4 | 131.5 | | | | |
| **NorthEast: Reeves Road** | | | | | | | | | | | | | | | |
| Lane 1 (B) | 28 | 100.0 | 28 | 100.0 | 368 | 0.076 | 100 | 23.3 | LOS C | 0.8 | 10.0 | Full | 50 | 0.0 | 0.0 |
| Approach | 28 | 100.0 | 28 | 100.0 | | 0.076 | | 23.3 | LOS C | 0.8 | 10.0 | | | | |
| **NorthWest: Ti Rakau Drive (West)** | | | | | | | | | | | | | | | |
| Lane 1 (B) | 22 | 100.0 | 22 | 100.0 | 184 | 0.120 | 100 | 31.8 | LOS C | 0.6 | 8.4 | Full | 110 | 0.0 | 0.0 |
| Lane 2 | 271 | 17.2 | 268 | 17.3 | 609 | 0.440 | 100 | 39.0 | LOS D | 13.0 | 104.7 | Full | 110 | 0.0 | 10.5 |
| Lane 3 | 271 | 17.2 | 268 | 17.3 | 609 | 0.440 | 100 | 39.0 | LOS D | 13.0 | 104.7 | Full | 110 | 0.0 | 10.5 |
| Lane 4 | 100 | 7.0 | 99 | 7.1 | 217 | 0.456 | 100 | 70.2 | LOS E | 6.0 | 44.5 | Short | 71 | 0.0 | NA |
| Approach | 664 | 18.4 | 657 N1 | 18.5 | | 0.456 | | 43.4 | LOS D | 13.0 | 104.7 | | | | |
| **SouthWest: Pakuranga Highway** | | | | | | | | | | | | | | | |
| Lane 1 | 132 | 10.6 | 132 | 10.6 | 263 | 0.502 | 100 | 41.8 | LOS D | 6.1 | 46.4 | Short | 72 | -50.0 N3 | NA |
| Lane 2 | 248 | 12.3 | 248 | 12.3 | 294 1 | 0.844 | 100 | 78.0 | LOS E | 16.7 | 129.1 | Short | 143 | 0.0 | NA |
| Lane 3 | 259 | 12.3 | 259 | 12.3 | 307 | 0.844 | 100 | 78.2 | LOS E | 17.5 | 135.7 | Short | 240 | 0.0 | NA |
| Lane 4 | 259 | 12.3 | 259 | 12.3 | 307 | 0.844 | 100 | 78.2 | LOS E | 17.5 | 135.7 | Full | 623 | 0.0 | 0.0 |
| Approach | 899 | 12.0 | 899 | 12.0 | | 0.844 | | 72.8 | LOS E | 17.5 | 135.7 | | | | |
| Intersection | 3370 | 14.0 | 3363 N1 | 14.0 | | 1.020 | | 65.5 | LOS E | 17.5 | 135.7 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.
N3 Capacity Adjustment due to downstream lane blockage determined by the program.
N4 Average back of queue has been restricted to the available queue storage space.
N6 Continuous Lane results determined by Back of Queue values of downstream lanes (proportional to lane movement flows) but average back of queue has been restricted to the available queue storage space.

**Approach Lane Flows (veh/h)**

| SouthEast: Ti Rakau Drive (East) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Mov. From SE | L2 | T1 | Total | %HV | Cap. | Deg. Satn | Lane Util. | Prob. SL Ov. | Ov. Lane |

| To Exit: | SW | NW | | | veh/h | v/c | % | % | No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 404 | - | 404 | 12.8 | 1229 | 0.328 | 100 | 46.1 | 2 |
| Lane 2 | 404 | - | 404 | 12.8 | 1229 | 0.328 | 100 | NA | NA |
| Lane 3 | - | 474 | 474 | 9.1 | 464 | 1.020 | 100 | NA | NA |
| Lane 4 | - | 474 | 474 | 9.1 | 464 | 1.020 | 100 | NA | NA |
| Lane 5 | - | 25 | 25 | 100.0 | 155 | 0.161 | 100 | NA | NA |
| Approach | 807 | 972 | 1779 | 12.0 | | 1.020 | | | |

NorthEast: Reeves Road

| Mov.<br>From NE<br>To Exit: | R2<br><br>NW | Total | %HV | Cap.<br>veh/h | Deg.<br>Satn<br>v/c | Lane<br>Util.<br>% | Prob.<br>SL Ov.<br>% | Ov.<br>Lane<br>No. |
|---|---|---|---|---|---|---|---|---|
| Lane 1 | 28 | 28 | 100.0 | 368 | 0.076 | 100 | NA | NA |
| Approach | 28 | 28 | 100.0 | | 0.076 | | | |

NorthWest: Ti Rakau Drive (West)

| Mov.<br>From NW<br>To Exit: | L2<br><br>NE | T1<br><br>SE | R2<br><br>SW | Total | %HV | Cap.<br>veh/h | Deg.<br>Satn<br>v/c | Lane<br>Util.<br>% | Prob.<br>SL Ov.<br>% | Ov.<br>Lane<br>No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 9 | 13 | - | 22 | 100.0 | 184 | 0.120 | 100 | NA | NA |
| Lane 2 | - | 268 | - | 268 | 17.3 | 609 | 0.440 | 100 | NA | NA |
| Lane 3 | - | 268 | - | 268 | 17.3 | 609 | 0.440 | 100 | NA | NA |
| Lane 4 | - | - | 99 | 99 | 7.1 | 217 | 0.456 | 100 | 0.0 | 3 |
| Approach | 9 | 549 | 99 | 657 | 18.5 | | 0.456 | | | |

SouthWest: Pakuranga Highway

| Mov.<br>From SW<br>To Exit: | L2<br><br>NW | R2<br><br>SE | Total | %HV | Cap.<br>veh/h | Deg.<br>Satn<br>v/c | Lane<br>Util.<br>% | Prob.<br>SL Ov.<br>% | Ov.<br>Lane<br>No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 132 | - | 132 | 10.6 | 263 | 0.502 | 100 | 0.0 | 2 |
| Lane 2 | - | 248 | 248 | 12.3 | 294 [1] | 0.844 | 100 | 5.7 | 3 |
| Lane 3 | - | 259 | 259 | 12.3 | 307 | 0.844 | 100 | 0.0 | 4 |
| Lane 4 | - | 259 | 259 | 12.3 | 307 | 0.844 | 100 | NA | NA |
| Approach | 132 | 767 | 899 | 12.0 | | 0.844 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 3363 | 14.0 | 1.020 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

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

**Merge Analysis**

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast Exit: Ti Rakau Drive (East)<br>Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 4 | Merge Analysis not applied. | | | | | | | | | |
| NorthEast Exit: Reeves Road<br>Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| NorthWest Exit: Ti Rakau Drive (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | | |
| SouthWest Exit: Pakuranga Highway<br>Merge Type: **Zipper** | | | | | | | | | | | | |
| Exit Short Lane | 1 | 280 | 50.0 | 251 | 266 | 2.50 | 2.00 | 404 | 1477 | 0.273 | 0.0 | 0.2 |
| Merge Lane | 2 | - | 50.0 | 202 | 215 | 2.50 | 2.00 | 502 | 1545 | 0.325 | 0.0 | 0.1 |
| SouthWest Exit: Pakuranga Highway<br>Merge Type: **Zipper** | | | | | | | | | | | | |
| Exit Short Lane | 3 | 10 | 50.0 | 202 | 215 | 2.50 | 2.00 | 99 | 1545 | 0.064 | 0.0 | 0.1 |
| Merge Lane | 2 | - | 50.0 | 49 | 51 | 2.50 | 2.00 | 404 | 1743 | 0.232 | 0.0 | 0.0 |

# CCG LANE SUMMARY

## Common Control Group: CCG3 [Aylesbury/ WR/ Reeves Rd]

## Network: N101 [AM (Network Folder: General)]

EQUISAT (Fixed-Time/SCATS) Isolated    Cycle Time = 112 seconds (CCG User-Given Phase Times)

| Lane Use and Performance (CCG) | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | DEMAND FLOWS [ Total | HV ] | ARRIVAL FLOWS [ Total | HV ] | Cap. | Deg. Satn | Lane Util. | Aver. Delay | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] | Lane Config | Lane Length | Cap. Adj. | Prob. Block. |
| | veh/h | % | veh/h | % | veh/h | v/c | % | sec | | | m | | m | % | % |
| Site: 5.2v [5.2 Aylesbury St/ Reeves Rd/ Busway Link signalised] | | | | | | | | | | | | | | | | |
| SouthEast: Reeves Road (East) | | | | | | | | | | | | | | | | |
| Lane 1 | 136 | 8.1 | 136 | 8.1 | 330 | 0.412 | 100 | 14.9 | LOS B | 2.4 | 18.0 | Full | 27 | -8.6 N7 | 0.0 |
| Approach | 136 | 8.1 | 136 | 8.1 | | 0.412 | | 14.9 | LOS B | 2.4 | 18.0 | | | | |
| East: Pakuranga Rd Busway Link (Southbound) | | | | | | | | | | | | | | | | |
| Lane 1 (B) | 28 | 100.0 | 28 | 100.0 | 142 | 0.197 | 100 | 54.1 | LOS D | 1.3 | 16.8 | Full | 203 | 0.0 | 0.0 |
| Approach | 28 | 100.0 | 28 | 100.0 | | 0.197 | | 54.1 | LOS D | 1.3 | 16.8 | | | | |
| NorthWest: Aylesbury Street | | | | | | | | | | | | | | | | |
| Lane 1 | 21 | 0.0 | 21 | 0.0 | 141 | 0.149 | 100 | 51.4 | LOS D | 1.0 | 6.8 | Full | 284 | -31.1 N7 | 0.0 |
| Approach | 21 | 0.0 | 21 | 0.0 | | 0.149 | | 51.4 | LOS D | 1.0 | 6.8 | | | | |
| SouthWest: Reeves Road (South) | | | | | | | | | | | | | | | | |
| Lane 1 | 116 | 22.5 | 115 | 22.6 | 193 | 0.596 | 100 | 48.0 | LOS D | 5.4 | 45.1 | Full | 180 | -42.6 N7 | 0.0 |
| Approach | 116 | 22.5 | 115 N1 | 22.6 | | 0.596 | | 48.0 | LOS D | 5.4 | 45.1 | | | | |
| Intersection | 301 | 21.6 | 300 N1 | 21.7 | | 0.596 | | 33.8 | LOS C | 5.4 | 45.1 | | | | |
| Site: 7.3v [7.3 William Roberts Rd / Reeves Rd signalised] | | | | | | | | | | | | | | | | |
| SouthEast: Reeves Rd (East) | | | | | | | | | | | | | | | | |
| Lane 1 | 303 | 8.3 | 303 | 8.3 | 321 1 | 0.943 | 100 | 76.2 | LOS E | 18.7 | 140.1 | Full | 810 | 0.0 | 0.0 |
| Lane 2 | 108 | 7.4 | 108 | 7.4 | 376 | 0.287 | 100 | 43.4 | LOS D | 4.5 | 33.6 | Short | 45 | 0.0 | NA |
| Approach | 411 | 8.0 | 411 | 8.0 | | 0.943 | | 67.6 | LOS E | 18.7 | 140.1 | | | | |
| NorthWest: Reeves Rd (West) | | | | | | | | | | | | | | | | |
| Lane 1 | 107 | 15.0 | 107 | 15.0 | 464 | 0.230 | 100 | 43.1 | LOS D | 4.8 | 37.9 | Full | 27 | 0.0 | 46.2 |
| Approach | 107 | 15.0 | 107 | 15.0 | | 0.230 | | 43.1 | LOS D | 4.8 | 37.9 | | | | |
| SouthWest: William Roberts Road (South) | | | | | | | | | | | | | | | | |
| Lane 1 | 333 | 12.3 | 332 | 12.3 | 351 | 0.947 | 100 | 75.2 | LOS E | 21.0 | 162.3 | Full | 223 | 0.0 | 0.0 |
| Approach | 333 | 12.3 | 332 N1 | 12.3 | | 0.947 | | 75.2 | LOS E | 21.0 | 162.3 | | | | |
| Intersection | 851 | 10.6 | 849 N1 | 10.6 | | 0.947 | | 67.5 | LOS E | 21.0 | 162.3 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.
N7 The capacity reduction has been determined from the queue blockage probability of a Site further downstream due to intermediate continuous lanes.

## Approach Lane Flows (CCG) (veh/h)

Site: 5.2v [5.2 Aylesbury St/ Reeves Rd/ Busway Link signalised]

SouthEast: Reeves Road (East)

| Mov. From SE To Exit: | L2 SW | T1 NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 101 | 35 | 136 | 8.1 | 330 | 0.412 | 100 | NA | NA |
| Approach | 101 | 35 | 136 | 8.1 | | 0.412 | | | |

East: Pakuranga Rd Busway Link (Southbound)

| Mov. From E To Exit: | L1 SW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|
| Lane 1 | 28 | 28 | 100.0 | 142 | 0.197 | 100 | NA | NA |
| Approach | 28 | 28 | 100.0 | | 0.197 | | | |

NorthWest: Aylesbury Street

| Mov. From NW To Exit: | T1 SE | R2 SW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 11 | 10 | 21 | 0.0 | 141 | 0.149 | 100 | NA | NA |
| Approach | 11 | 10 | 21 | 0.0 | | 0.149 | | | |

SouthWest: Reeves Road (South)

| Mov. From SW To Exit: | L2 NW | T1 NE | R2 SE | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 12 | 9 | 95 | 115 | 22.6 | 193 | 0.596 | 100 | NA | NA |
| Approach | 12 | 9 | 95 | 115 | 22.6 | | 0.596 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 300 | 21.7 | 0.596 |

Site: 7.3v [7.3 William Roberts Rd / Reeves Rd signalised]

SouthEast: Reeves Rd (East)

| Mov. From SE To Exit: | L2 SW | T1 NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 303 | - | 303 | 8.3 | 321[1] | 0.943 | 100 | NA | NA |
| Lane 2 | - | 108 | 108 | 7.4 | 376 | 0.287 | 100 | 0.0 | 1 |
| Approach | 303 | 108 | 411 | 8.0 | | 0.943 | | | |

NorthWest: Reeves Rd (West)

| Mov. From NW To Exit: | T1 SE | R2 SW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 85 | 22 | 107 | 15.0 | 464 | 0.230 | 100 | NA | NA |
| Approach | 85 | 22 | 107 | 15.0 | | 0.230 | | | |

SouthWest: William Roberts Road (South)

| Mov. From SW To Exit: | L2 NW | R2 SE | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 25 | 307 | 332 | 12.3 | 351 | 0.947 | 100 | NA | NA |
| Approach | 25 | 307 | 332 | 12.3 | | 0.947 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 849 | 10.6 | 0.947 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

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

**Merge Analysis (CCG)**

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site: 5.2v [5.2 Aylesbury St/ Reeves Rd/ Busway Link signalised] | | | | | | | | | | | | |
| SouthEast Exit: Reeves Road (East)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| NorthEast Exit: Pakuranga Rd Busway Link (Northbound)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| NorthWest Exit: Aylesbury Street<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| SouthWest Exit: Reeves Road (South)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Site: 7.3v [7.3 William Roberts Rd / Reeves Rd signalised] | | | | | | | | | | | | |
| SouthEast Exit: Reeves Rd (East)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| NorthWest Exit: Reeves Rd (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| SouthWest Exit: William Roberts Road (South)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |

# CCG LANE SUMMARY

## Common Control Group: CCG2 [WRR / Mattson]

## Network: N101 [AM (Network Folder: General)]

EQUISAT (Fixed-Time/SCATS) Isolated    Cycle Time = 110 seconds (CCG User-Given Phase Times)

**Lane Use and Performance (CCG)**

| | DEMAND FLOWS [ Total | HV ] | ARRIVAL FLOWS [ Total | HV ] | Cap. | Deg. Satn | Lane Util. | Aver. Delay | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] | Lane Config | Lane Length | Cap. Adj. | Prob. Block. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | veh/h | % | veh/h | % | veh/h | v/c | % | sec | | | m | | m | % | % |
| **Site: 7.0 [7.0 William Roberts Rd / Ti Rakau Dr]** | | | | | | | | | | | | | | | |
| SouthEast: Ti Rakau Drive (East) | | | | | | | | | | | | | | | |
| Lane 1 | 535 | 11.2 | 535 | 11.2 | 953 | 0.561 | 100 | 5.7 | LOS A | 7.1 | 54.7 | Full | 60 | 0.0 | 6.7 |
| Lane 2 | 535 | 11.2 | 535 | 11.2 | 953 | 0.561 | 100 | 1.1 | LOS A | 1.6 | 12.3 | Full | 60 | 0.0 | 0.0 |
| Lane 3 | 442 | 11.2 | 442 | 11.2 | 788 | 0.561 | 100 | 1.1 | LOS A | 1.3 | 10.1 | Full | 60 | -17.4[N7] | 0.0 |
| Lane 4 | 96 | 8.3 | 96 | 8.3 | 123[1] | 0.778 | 100 | 58.9 | LOS E | 4.8 | 36.3 | Short | 20 | 0.0 | NA |
| Lane 5 (B) | 25 | 100.0 | 25 | 100.0 | 630 | 0.040 | 100 | 0.6 | LOS A | 0.0 | 0.3 | Full | 60 | 0.0 | 0.0 |
| Approach | 1633 | 12.4 | 1633 | 12.4 | | 0.778 | | 6.0 | LOS A | 7.1 | 54.7 | | | | |
| NorthEast: William Roberts Road Extension | | | | | | | | | | | | | | | |
| Lane 1 | 165 | 10.3 | 165 | 10.3 | 313 | 0.527 | 100 | 46.9 | LOS D | 7.3 | 56.0 | Short | 80 | 0.0 | NA |
| Lane 2 | 167 | 8.4 | 167 | 8.4 | 183 | 0.910 | 100 | 70.4 | LOS E | 9.7 | 73.0 | Full | 110 | -17.4[N7] | 0.0 |
| Approach | 332 | 9.3 | 332 | 9.3 | | 0.910 | | 58.7 | LOS E | 9.7 | 73.0 | | | | |
| NorthWest: Ti Rakau Drive (West) | | | | | | | | | | | | | | | |
| Lane 1 | 359 | 11.6 | 358 | 11.6 | 706 | 0.507 | 100 | 23.6 | LOS C | 10.9 | 83.8 | Full | 107 | 0.0 | 0.0 |
| Lane 2 | 474 | 15.2 | 472 | 15.3 | 930 | 0.507 | 100 | 17.9 | LOS B | 14.5 | 114.6 | Full | 107 | 0.0 | 21.3 |
| Lane 3 | 474 | 15.2 | 472 | 15.3 | 930 | 0.507 | 100 | 17.9 | LOS B | 14.5 | 114.6 | Full | 107 | 0.0 | 21.3 |
| Lane 4 (B) | 13 | 100.0 | 13 | 100.0 | 630 | 0.021 | 100 | 0.6 | LOS A | 0.0 | 0.2 | Full | 107 | 0.0 | 0.0 |
| Approach | 1320 | 15.1 | 1314[N1] | 15.1 | | 0.507 | | 19.3 | LOS B | 14.5 | 114.6 | | | | |
| Intersection | 3285 | 13.2 | 3279[N1] | 13.2 | | 0.910 | | 16.7 | LOS B | 14.5 | 114.6 | | | | |
| **Site: 7.5 [7.5 Mattson Rd/ Ti Rakau Dr]** | | | | | | | | | | | | | | | |
| SouthEast: Ti Rakau Drive (East) | | | | | | | | | | | | | | | |
| Lane 1 | 256 | 10.4 | 256 | 10.4 | 285 | 0.898 | 100 | 73.0 | LOS E | 15.3 | 116.8 | Short | 25 | -46.3[N3] | NA |
| Lane 2 | 472 | 11.1 | 472 | 11.1 | 525[1] | 0.898 | 100 | 40.5 | LOS D | 21.2 | 162.6 | Full | 143 | -1.5[N7] | 26.7 |
| Lane 3 | 857 | 11.1 | 857 | 11.1 | 954 | 0.898 | 100 | 37.0 | LOS D | 27.3[N4] | 209.0[N4] | Full | 143 | 0.0 | 50.0 |
| Lane 4 (B) | 25 | 100.0 | 25 | 100.0 | 620 | 0.040 | 100 | 13.3 | LOS B | 0.6 | 7.4 | Full | 143 | 0.0 | 0.0 |
| Approach | 1609 | 12.4 | 1609 | 12.4 | | 0.898 | | 43.4 | LOS D | 27.3 | 209.0 | | | | |
| NorthWest: Ti Rakau Drive (West) | | | | | | | | | | | | | | | |
| Lane 1 | 131 | 14.4 | 131 | 14.5 | 935 | 0.140 | 27[6] | 28.8 | LOS C | 5.8 | 45.7 | Full | 60 | 0.0 | 0.0 |
| Lane 2 | 482 | 14.4 | 480 | 14.5 | 935 | 0.513 | 100 | 4.4 | LOS A | 4.8 | 38.0 | Full | 60 | 0.0 | 0.0 |
| Lane 3 | 482 | 14.4 | 480 | 14.5 | 935 | 0.513 | 100 | 1.0 | LOS A | 1.2 | 9.8 | Full | 60 | 0.0 | 0.0 |
| Lane 4 | 26 | 15.4 | 26 | 15.4 | 303 | 0.086 | 100 | 52.9 | LOS D | 1.2 | 9.8 | Short | 25 | 0.0 | NA |
| Lane 5 (B) | 13 | 100.0 | 13 | 100.0 | 620 | 0.021 | 100 | 1.5 | LOS A | 0.0 | 0.4 | Full | 60 | 0.0 | 0.0 |
| Approach | 1134 | 15.4 | 1130[N1] | 15.5 | | 0.513 | | 6.9 | LOS A | 5.8 | 45.7 | | | | |
| SouthWest: Mattson Road | | | | | | | | | | | | | | | |
| Lane 1 | 54 | 7.4 | 54 | 7.4 | 160 | 0.338 | 100 | 49.2 | LOS D | 2.4 | 17.8 | Full | 282 | -50.0[N3] | 0.0 |
| Lane 2 | 25 | 12.0 | 25 | 12.0 | 217 | 0.115 | 100 | 51.5 | LOS D | 1.1 | 8.4 | Full | 282 | 0.0 | 0.0 |
| Approach | 79 | 8.9 | 79 | 8.9 | | 0.338 | | 50.0 | LOS D | 2.4 | 17.8 | | | | |
| Intersection | 2822 | 13.5 | 2818[N1] | 13.5 | | 0.898 | | 28.9 | LOS C | 27.3 | 209.0 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
6 Lane under-utilisation due to downstream effects
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.
N3 Capacity Adjustment due to downstream lane blockage determined by the program.
N4 Average back of queue has been restricted to the available queue storage space.
N7 The capacity reduction has been determined from the queue blockage probability of a Site further downstream due to intermediate continuous lanes.

**Approach Lane Flows (CCG) (veh/h)**

Site: 7.0 [7.0 William Roberts Rd / Ti Rakau Dr]

SouthEast: Ti Rakau Drive (East)

| Mov. From SE To Exit: | T1 NW | R2 NE | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 535 | - | 535 | 11.2 | 953 | 0.561 | 100 | NA | NA |
| Lane 2 | 535 | - | 535 | 11.2 | 953 | 0.561 | 100 | NA | NA |
| Lane 3 | 442 | - | 442 | 11.2 | 788 | 0.561 | 100 | NA | NA |
| Lane 4 | - | 96 | 96 | 8.3 | 123[1] | 0.778 | 100 | 70.7 | 3 |
| Lane 5 | 25 | - | 25 | 100.0 | 630 | 0.040 | 100 | NA | NA |
| Approach | 1537 | 96 | 1633 | 12.4 | | 0.778 | | | |

NorthEast: William Roberts Road Extension

| Mov. From NE To Exit: | L2 SE | R2 NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 165 | - | 165 | 10.3 | 313 | 0.527 | 100 | 0.0 | 2 |
| Lane 2 | - | 167 | 167 | 8.4 | 183 | 0.910 | 100 | NA | NA |
| Approach | 165 | 167 | 332 | 9.3 | | 0.910 | | | |

NorthWest: Ti Rakau Drive (West)

| Mov. From NW To Exit: | L2 NE | T1 SE | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 347 | 10 | 358 | 11.6 | 706 | 0.507 | 100 | NA | NA |
| Lane 2 | - | 472 | 472 | 15.3 | 930 | 0.507 | 100 | NA | NA |
| Lane 3 | - | 472 | 472 | 15.3 | 930 | 0.507 | 100 | NA | NA |
| Lane 4 | - | 13 | 13 | 100.0 | 630 | 0.021 | 100 | NA | NA |
| Approach | 347 | 967 | 1314 | 15.1 | | 0.507 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 3279 | 13.2 | 0.910 |

Site: 7.5 [7.5 Mattson Rd/ Ti Rakau Dr]

SouthEast: Ti Rakau Drive (East)

| Mov. From SE To Exit: | L2 SW | T1 NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 35 | 221 | 256 | 10.4 | 285 | 0.898 | 100 | 100.0 | 2 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Lane 2 | - | 472 | 472 | 11.1 | 525 [1] | 0.898 | 100 | NA | NA |
| Lane 3 | - | 857 | 857 | 11.1 | 954 | 0.898 | 100 | NA | NA |
| Lane 4 | - | 25 | 25 | 100.0 | 620 | 0.040 | 100 | NA | NA |
| Approach | 35 | 1574 | 1609 | 12.4 | | 0.898 | | | |

NorthWest: Ti Rakau Drive (West)

| Mov. From NW To Exit: | T1 SE | R2 SW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 131 | - | 131 | 14.5 | 935 | 0.140 | 27 [6] | NA | NA |
| Lane 2 | 480 | - | 480 | 14.5 | 935 | 0.513 | 100 | NA | NA |
| Lane 3 | 480 | - | 480 | 14.5 | 935 | 0.513 | 100 | NA | NA |
| Lane 4 | - | 26 | 26 | 15.4 | 303 | 0.086 | 100 | 0.0 | 3 |
| Lane 5 | 13 | - | 13 | 100.0 | 620 | 0.021 | 100 | NA | NA |
| Approach | 1104 | 26 | 1130 | 15.5 | | 0.513 | | | |

SouthWest: Mattson Road

| Mov. From SW To Exit: | L2 NW | R2 SE | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 54 | - | 54 | 7.4 | 160 | 0.338 | 100 | NA | NA |
| Lane 2 | - | 25 | 25 | 12.0 | 217 | 0.115 | 100 | NA | NA |
| Approach | 54 | 25 | 79 | 8.9 | | 0.338 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 2818 | 13.5 | 0.898 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

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

6 Lane under-utilisation due to downstream effects

## Merge Analysis (CCG)

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Site: 7.0 [7.0 William Roberts Rd / Ti Rakau Dr] | | | | | | | | | | | |
| SouthEast Exit: Ti Rakau Drive (East) Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 4 | Merge Analysis not applied. | | | | | | | | | |
| NorthEast Exit: William Roberts Road Extension Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| NorthWest Exit: Ti Rakau Drive (West) Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 4 | Merge Analysis not applied. | | | | | | | | | |

| Site: 7.5 [7.5 Mattson Rd/ Ti Rakau Dr] | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast Exit: Ti Rakau Drive (East)<br>Merge Type: **Priority** | | | | | | | | | | | | | |
| Exit Short Lane | 1 | 40 | 0.0 | 480 | 515 | 3.00 | 2.00 | 131 | 1271 | 0.103 | 0.9 | 1.1 |
| Merge Lane | 2 | - | 100.0 | Merge Lane is not Opposed | | | | 480 | 1800 | 0.267 | 0.0 | 0.0 |
| NorthWest Exit: Ti Rakau Drive (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 4 | Merge Analysis not applied. | | | | | | | | | | |
| SouthWest Exit: Mattson Road<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |

# LANE SUMMARY

**Site: 7.1 [7.1 William Roberts Rd / Cortina Pl (Site Folder: AM)]**

**Network: N101 [AM (Network Folder: General)]**

Site Category: (None)
Give-Way (Two-Way)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NorthEast: William Roberts Road (North) | | | | | | | | | | | | | | | |
| Lane 1 | 368 | 8.7 | 368 | 8.7 | 1593 | 0.231 | 100 | 1.9 | LOS A | 0.7 | 5.1 | Full | 223 | 0.0 | 0.0 |
| Approach | 368 | 8.7 | 368 | 8.7 | | 0.231 | | 1.9 | NA | 0.7 | 5.1 | | | | |
| NorthWest: Cortina Place | | | | | | | | | | | | | | | |
| Lane 1 | 92 | 13.0 | 92 | 13.1 | 740 | 0.124 | 100 | 5.3 | LOS A | 0.3 | 2.7 | Full | 177 | 0.0 | 0.0 |
| Approach | 92 | 13.0 | 92 | 13.1 | | 0.124 | | 5.3 | LOS A | 0.3 | 2.7 | | | | |
| SouthWest: William Roberts Road (South) | | | | | | | | | | | | | | | |
| Lane 1 | 447 | 11.0 | 445 | 11.0 | 1740 | 0.256 | 100 | 0.7 | LOS A | 0.0 | 0.0 | Full | 110 | 0.0 | 0.0 |
| Approach | 447 | 11.0 | 445 [N1] | 11.0 | | 0.256 | | 0.7 | NA | 0.0 | 0.0 | | | | |
| Intersection | 907 | 10.3 | 905 [N1] | 10.3 | | 0.256 | | 1.7 | NA | 0.7 | 5.1 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

**Approach Lane Flows (veh/h)**

NorthEast: William Roberts Road (North)

| Mov. From NE To Exit: | T1 SW | R2 NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 284 | 84 | 368 | 8.7 | 1593 | 0.231 | 100 | NA | NA |
| Approach | 284 | 84 | 368 | 8.7 | | 0.231 | | | |

NorthWest: Cortina Place

| Mov. From NW To Exit: | L2 NE | R2 SW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 29 | 63 | 92 | 13.1 | 740 | 0.124 | 100 | NA | NA |
| Approach | 29 | 63 | 92 | 13.1 | | 0.124 | | | |

SouthWest: William Roberts Road (South)

| Mov. From SW To Exit: | L2 NW | T1 NE | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 149 | 296 | 445 | 11.0 | 1740 | 0.256 | 100 | NA | NA |
| Approach | 149 | 296 | 445 | 11.0 | | 0.256 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|

| | | | |
|---|---|---|---|
| Intersection | 905 | 10.3 | 0.256 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

| Merge Analysis | Exit Lane Number | Short Lane Length | Percent Opng in Lane | Opposing Flow Rate | | Critical Gap | Follow-up Headway | Lane Flow Rate | Capacity | Deg. Satn | Min. Delay | Merge Delay |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | m | % | veh/h | pcu/h | sec | sec | veh/h | veh/h | v/c | sec | sec |
| NorthEast Exit: William Roberts Road (North)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| NorthWest Exit: Cortina Place<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| SouthWest Exit: William Roberts Road (South)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |

# CCG PHASING SUMMARY

## Common Control Group: CCG2 [WRR / Mattson]

## Network: N101 [AM (Network Folder: General)]

EQUISAT (Fixed-Time/SCATS) Isolated     Cycle Time = 110 seconds (CCG User-Given Phase Times)

**Timings based on settings in the Network Timing dialog**
**Phase Times determined by the program**
**Downstream lane blockage effects included in determining phase times**
**Green Split Priority has been specified**
**Phase Sequence: CCG Phasing**
**Reference Phase: Phase A1**
**Input Phase Sequence: A1, A2*, B, C, D**
**Output Phase Sequence: A1, B, C, D**
(* Variable Phase)

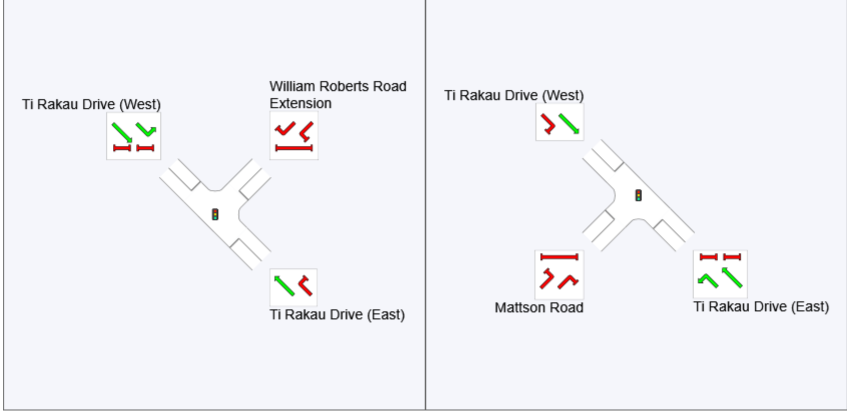
## Phase Timing Summary (CCG)

| Phase | A1 | B | C | D |
|---|---|---|---|---|
| Phase Change Time (sec) | 0 | 38 | 64 | 84 |
| Green Time (sec) | 32 | 20 | 14 | 20 |
| Phase Time (sec) | 38 | 26 | 20 | 26 |
| Phase Split | 35% | 24% | 18% | 24% |

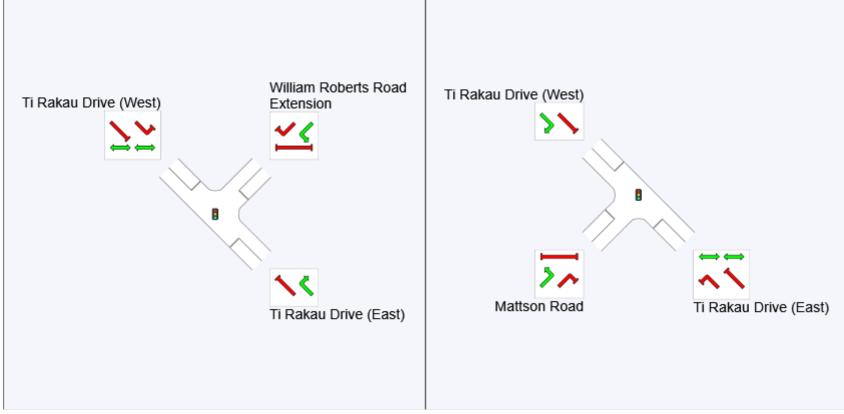
See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified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

## Output Phase Sequence (CCG)

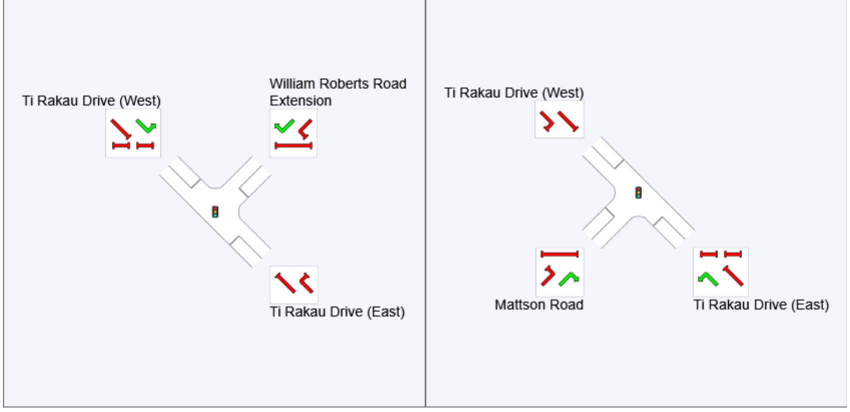
**Phase A1** **REF**



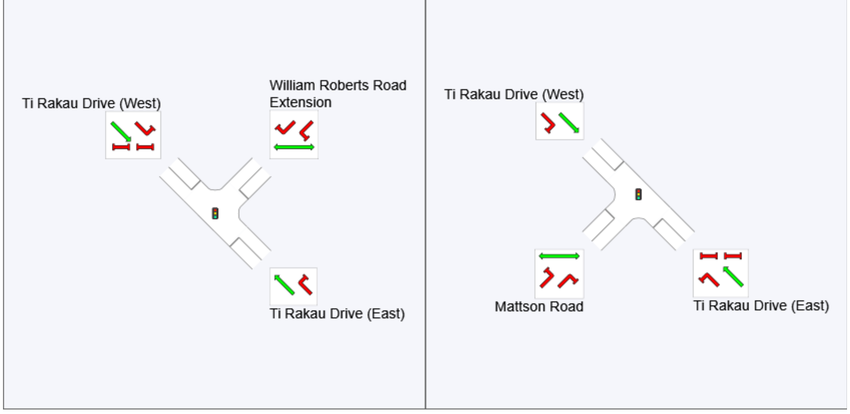

**Phase B**



## Phase C




## Phase D




REF: Reference Phase
VAR: Variable Phase

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

# CCG PHASING SUMMARY

## Common Control Group: CCG3 [Aylesbury/ WR/ Reeves Rd]

Network: N101 [AM (Network Folder: General)]

EQUISAT (Fixed-Time/SCATS) Isolated     Cycle Time = 112 seconds (CCG User-Given Phase Times)

**Timings based on settings in the Network Timing dialog**
**Phase Times specified by the user**
**Phase Sequence: CCG Phasing**
**Reference Phase: Phase A**
**Input Phase Sequence: A, B, C, C2, D**
**Output Phase Sequence: A, B, C, C2, D**

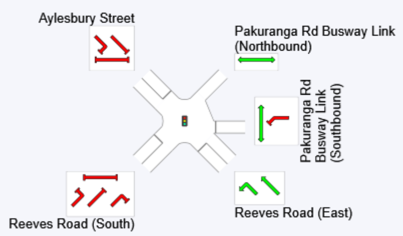
## Phase Timing Summary (CCG)

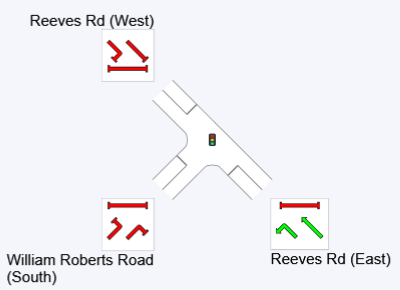
| Phase | **A** | **B** | **C** | **C2** | **D** |
|---|---|---|---|---|---|
| Phase Change Time (sec) | 0 | 29 | 49 | 67 | 84 |
| Green Time (sec) | 23 | 14 | 12 | 11 | 23 |
| Phase Time (sec) | 29 | 20 | 18 | 16 | 29 |
| Phase Split | 26% | 18% | 16% | 14% | 26% |

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

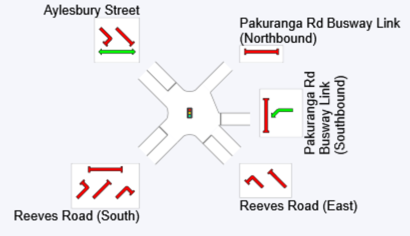
## Output Phase Sequence (CCG)

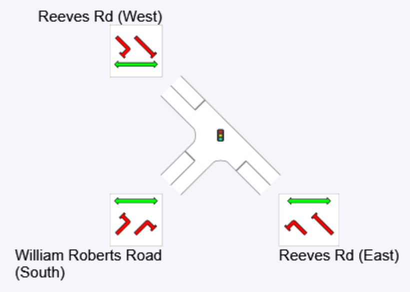
**Phase A** **REF**



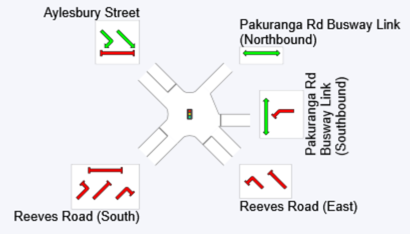



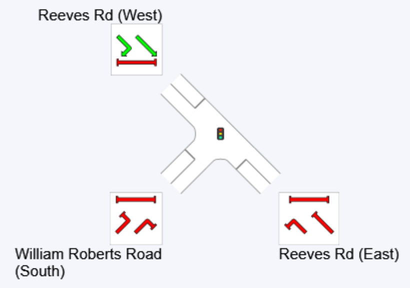
## Phase B



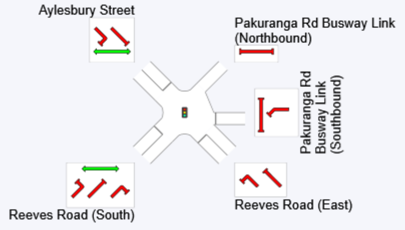



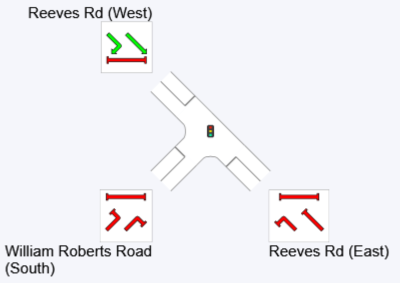

## Phase C



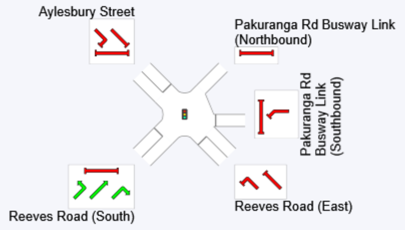



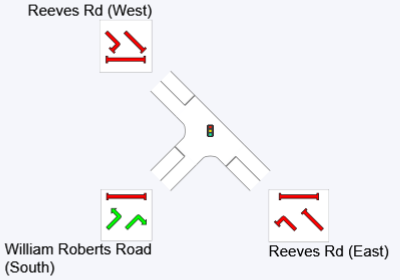
**Phase C2**




**Phase D**




REF: Reference Phase
VAR: Variable Phase

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

# PHASING SUMMARY

## Site: 5.0 [5.0 Pakuranga Highway / Reeves Rd (Site Folder: AM)]

## Network: N101 [AM (Network Folder: General)]

Site Category: (None)
Single Point Interchange (Signals) - EQUISAT (Fixed-Time/SCATS) Coordinated    Cycle Time = 146 seconds (Site User-Given Phase Times)

**Timings based on settings in the Site Phasing & Timing dialog**
**Phase Times specified by the user**
**Phase Sequence: Variable Phasing**
**Reference Phase: Phase A**
**Input Phase Sequence: A, B, C, D, E, F**
**Output Phase Sequence: A, B, C, D, E, F**

## Phase Timing Summary

| Phase | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| Phase Change Time (sec) | 0 | 32 | 51 | 79 | 111 | 123 |
| Green Time (sec) | 27 | 13 | 22 | 26 | 6 | 18 |
| Phase Time (sec) | 33 | 19 | 28 | 32 | 11 | 23 |
| Phase Split | 23% | 13% | 19% | 22% | 8% | 16% |

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

## Output Phase Sequence


REF: Reference Phase
VAR: Variable Phase

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

# PHASING SUMMARY

## Site: 4.0 [4.0 Palm Ave / Aylesbury St (Site Folder: AM)]

Network: N101 [AM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated    Cycle Time = 144 seconds (Site User-Given Phase Times)

**Timings based on settings in the Site Phasing & Timing dialog**
**Phase Times specified by the user**
**Phase Sequence: Variable Phasing**
**Reference Phase: Phase A**
**Input Phase Sequence: A, B, C, D, E**
**Output Phase Sequence: A, B, C, D, E**

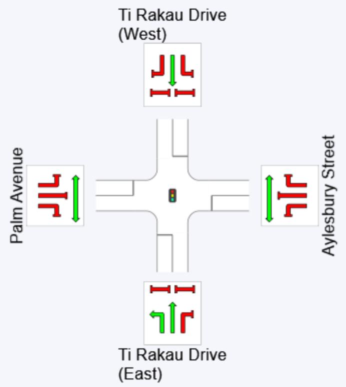
## Phase Timing Summary

| Phase | A | B | C | D | E |
|---|---|---|---|---|---|
| Phase Change Time (sec) | 0 | 56 | 80 | 97 | 127 |
| Green Time (sec) | 50 | 18 | 11 | 24 | 11 |
| Phase Time (sec) | 56 | 24 | 17 | 30 | 17 |
| Phase Split | 39% | 17% | 12% | 21% | 12% |

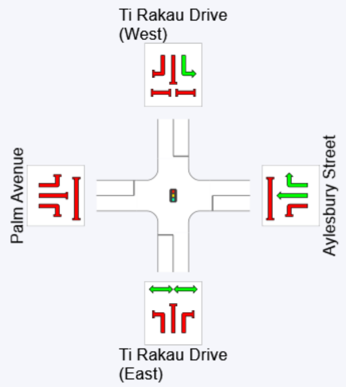
See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified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

## Output Phase Sequence

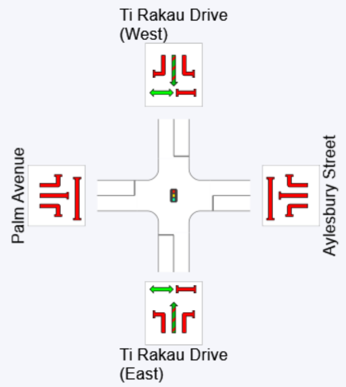
**Phase A** REF



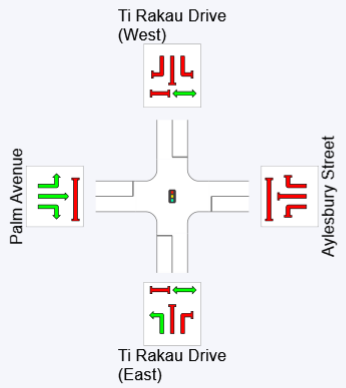

**Phase B**



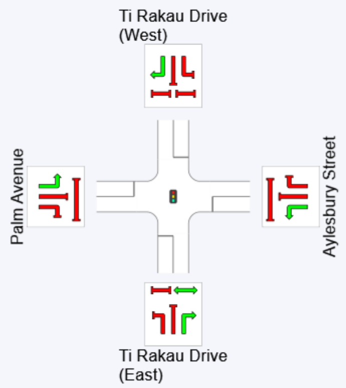

**Phase C**




**Phase D**




**Phase E**




REF: Reference Phase
VAR: Variable Phase

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

# PHASING SUMMARY

## Site: 3.0 [3.0 Pakuranga Highway / Pakuranga Rd (Site Folder: AM)]

## Network: N101 [AM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated    Cycle Time = 150 seconds (Site User-Given Phase Times)

**Timings based on settings in the Site Phasing & Timing dialog**
**Phase Times specified by the user**
**Phase Sequence: Variable Phasing**
**Reference Phase: Phase A**
**Input Phase Sequence: A, B, C, D**
**Output Phase Sequence: A, B, C, D**

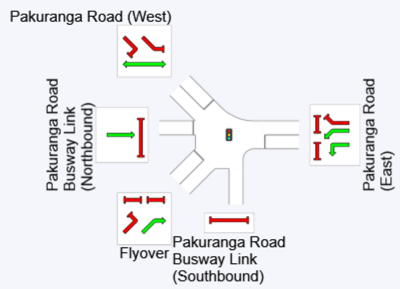
## Phase Timing Summary

| Phase | A | B | C | D |
|---|---|---|---|---|
| Phase Change Time (sec) | 0 | 63 | 99 | 118 |
| Green Time (sec) | 57 | 30 | 13 | 28 |
| Phase Time (sec) | 63 | 36 | 17 | 34 |
| Phase Split | 42% | 24% | 11% | 23% |

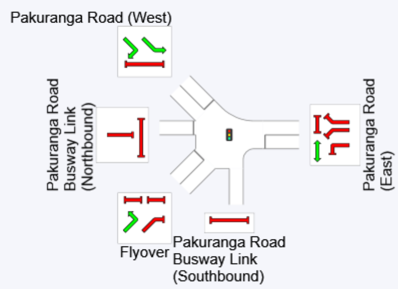
See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified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

## Output Phase Sequence

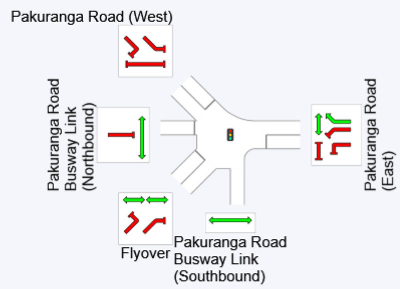
**Phase A** **REF**



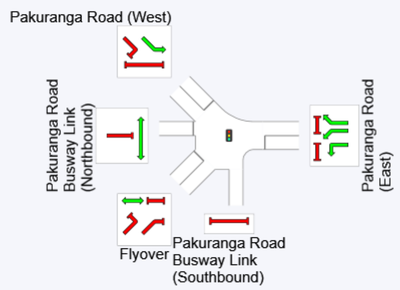

**Phase B**




**Phase C**




**Phase D**




REF: Reference Phase
VAR: Variable Phase

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

# PHASING SUMMARY

## Site: 1.0 [1.0 Pakuranga Rd / Ti Rakau Dr (Site Folder: AM)]

## Network: N101 [AM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated     Cycle Time = 100 seconds (Site Practical Cycle Time)

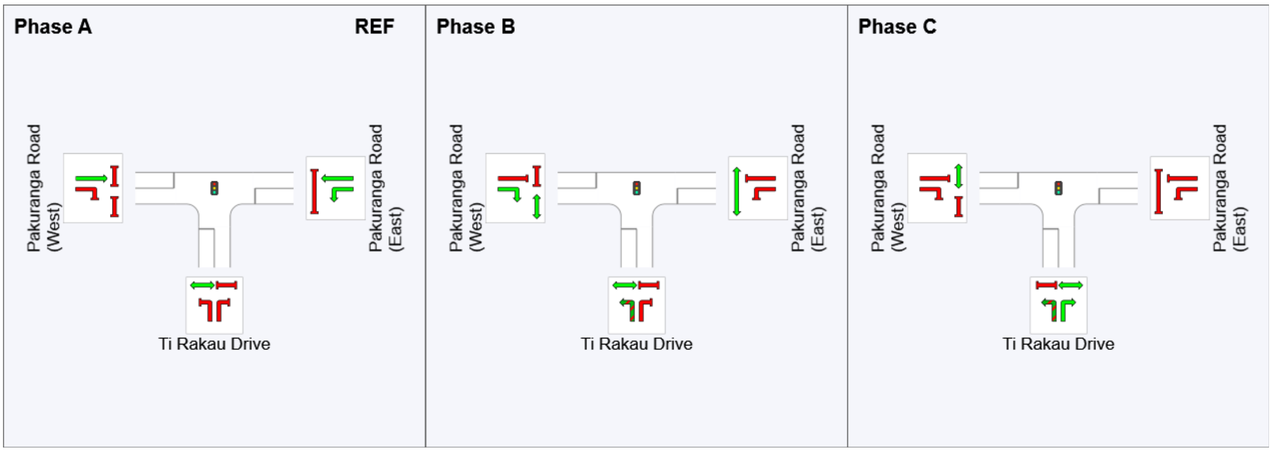
**Timings based on settings in the Site Phasing & Timing dialog**
**Phase Times determined by the program**
**Downstream lane blockage effects included in determining phase times**
**Phase Sequence: Variable Phasing**
**Reference Phase: Phase A**
**Input Phase Sequence: A, B, C**
**Output Phase Sequence: A, B, C**

## Phase Timing Summary

| Phase | A | B | C |
|---|---|---|---|
| Phase Change Time (sec) | 0 | 32 | 62 |
| Green Time (sec) | 26 | 24 | 32 |
| Phase Time (sec) | 32 | 30 | 38 |
| Phase Split | 32% | 30% | 38% |

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

## Output Phase Sequence




REF: Reference Phase
VAR: Variable Phase

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

# PHASING SUMMARY

## Site: 13.0 [13.0 Gossamer Dr / Ti Rakau Dr (Site Folder: AM)]

Network: N101 [AM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated    Cycle Time = 150 seconds (Site User-Given Phase Times)

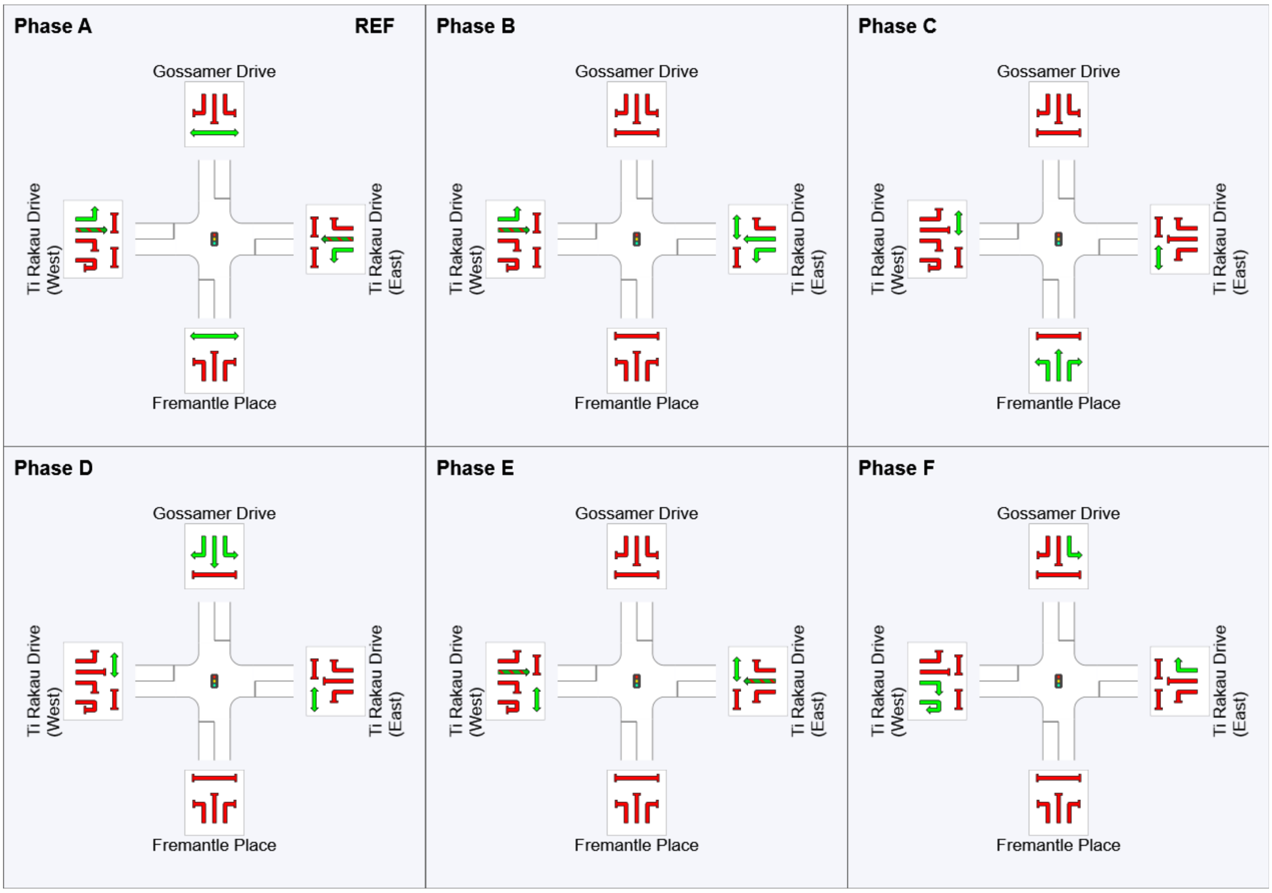
**Timings based on settings in the Site Phasing & Timing dialog**
**Phase Times specified by the user**
**Phase Sequence: Variable Phasing**
**Reference Phase: Phase A**
**Input Phase Sequence: A, B, C, D, E, F**
**Output Phase Sequence: A, B, C, D, E, F**

### Phase Timing Summary

| Phase | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| Phase Change Time (sec) | 0 | 54 | 72 | 86 | 103 | 123 |
| Green Time (sec) | 48 | 12 | 8 | 11 | 14 | 21 |
| Phase Time (sec) | 54 | 18 | 14 | 17 | 20 | 27 |
| Phase Split | 36% | 12% | 9% | 11% | 13% | 18% |

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

### Output Phase Sequence




REF: Reference Phase
VAR: Variable Phase

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

# PHASING SUMMARY

## Site: 10.1 [10.1 U-turn - East of Edgewater Dr (West) (Site Folder: AM)]

## Network: N101 [AM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated    Cycle Time = 40 seconds (Site Practical Cycle Time)

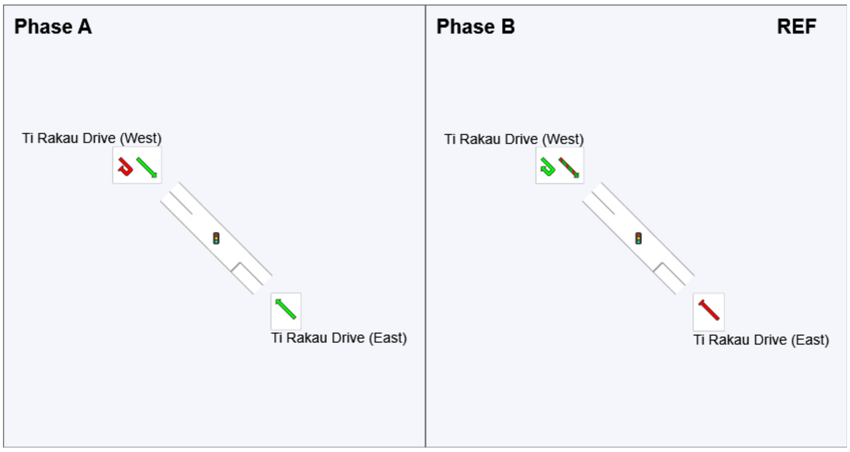
**Timings based on settings in the Site Phasing & Timing dialog**
**Phase Times determined by the program**
**Downstream lane blockage effects included in determining phase times**
**Phase Sequence: Opposed Turns**
**Reference Phase: Phase B**
**Input Phase Sequence: A, B**
**Output Phase Sequence: A, B**

### Phase Timing Summary

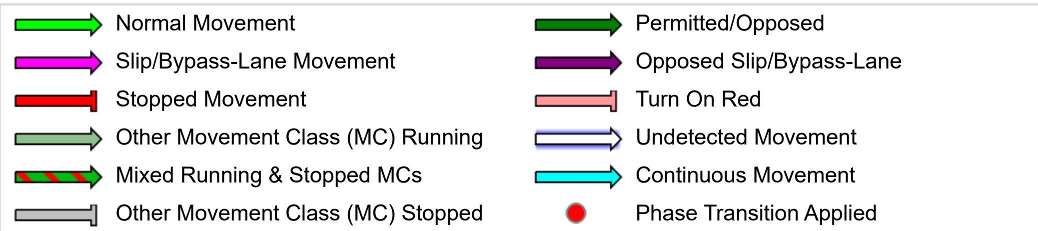
| Phase | A | B |
|---|---|---|
| Phase Change Time (sec) | 12 | 0 |
| Green Time (sec) | 22 | 6 |
| Phase Time (sec) | 28 | 12 |
| Phase Split | 70% | 30% |

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

### Output Phase Sequence




REF: Reference Phase
VAR: Variable Phase



# PHASING SUMMARY

## Site: 8.1 [8.1 U-turn - West of Marriot Rd (Site Folder: AM)]

Network: N101 [AM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated    Cycle Time = 30 seconds (Site Practical Cycle Time)

**Timings based on settings in the Site Phasing & Timing dialog**
**Phase Times determined by the program**
**Downstream lane blockage effects included in determining phase times**
**Phase Sequence: Opposed Turns**
**Reference Phase: Phase A**
**Input Phase Sequence: A, B**
**Output Phase Sequence: A, B**

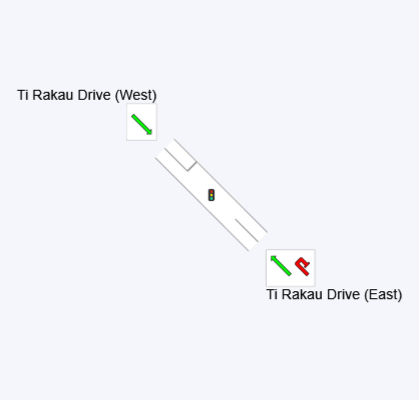
### Phase Timing Summary

| Phase | A | B |
|---|---|---|
| Phase Change Time (sec) | 0 | 18 |
| Green Time (sec) | 12 | 6 |
| Phase Time (sec) | 18 | 12 |
| Phase Split | 60% | 40% |

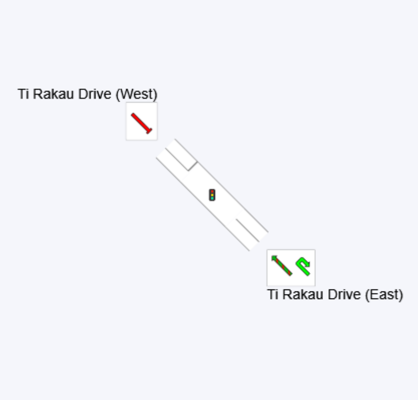
See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified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

### Output Phase Sequence

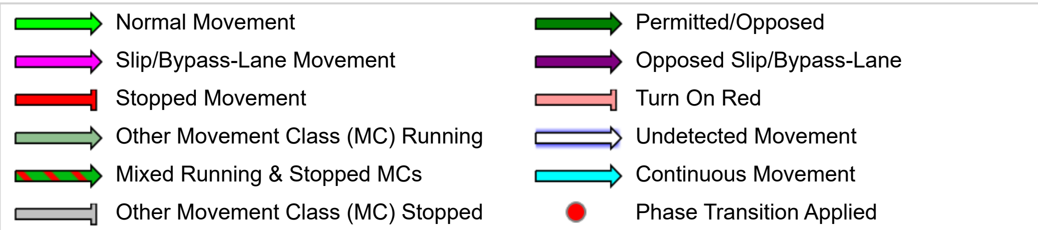
**Phase A** **REF**




**Phase B**




REF: Reference Phase
VAR: Variable Phase



# PHASING SUMMARY

## Site: 1.0 [1.0 Pakuranga Rd / Ti Rakau Dr (Site Folder: PM)]

## Network: N101 [PM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated    Cycle Time = 100 seconds (Site Practical Cycle Time)

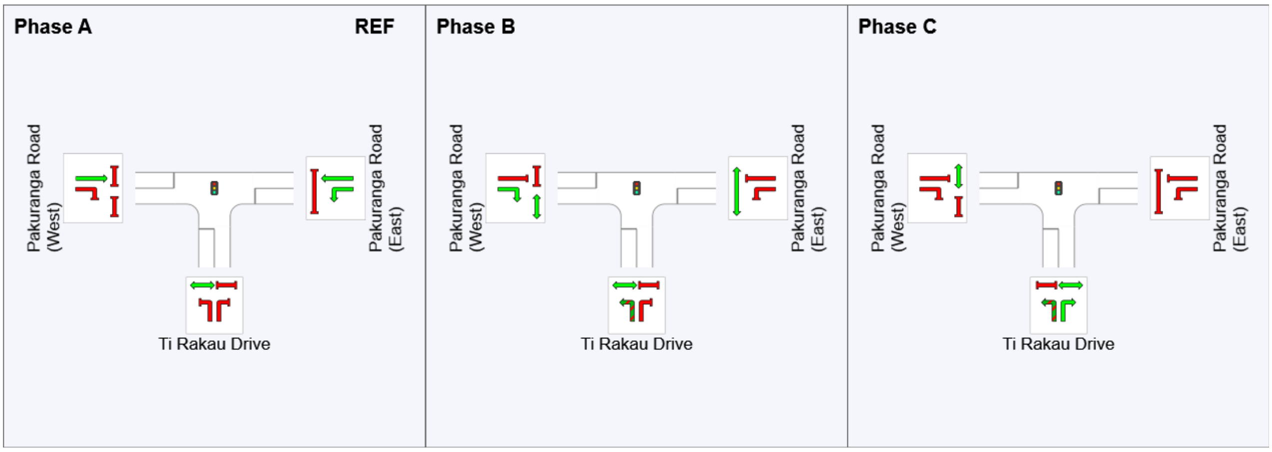
**Timings based on settings in the Site Phasing & Timing dialog**
**Phase Times determined by the program**
**Downstream lane blockage effects included in determining phase times**
**Phase Sequence: Variable Phasing**
**Reference Phase: Phase A**
**Input Phase Sequence: A, B, C**
**Output Phase Sequence: A, B, C**

### Phase Timing Summary

| Phase | A | B | C |
|---|---|---|---|
| Phase Change Time (sec) | 0 | 35 | 67 |
| Green Time (sec) | 29 | 26 | 27 |
| Phase Time (sec) | 35 | 32 | 33 |
| Phase Split | 35% | 32% | 33% |

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

### Output Phase Sequence




REF: Reference Phase
VAR: Variable Phase

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

# PHASING SUMMARY

## Site: 3.0 [3.0 Pakuranga Highway / Pakuranga Rd (Site Folder: PM)] Network: N101 [PM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated    Cycle Time = 150 seconds (Site User-Given Phase Times)

**Timings based on settings in the Site Phasing & Timing dialog**
**Phase Times specified by the user**
**Phase Sequence: Variable Phasing**
**Reference Phase: Phase A**
**Input Phase Sequence: A, B, C, D**
**Output Phase Sequence: A, B, C, D**

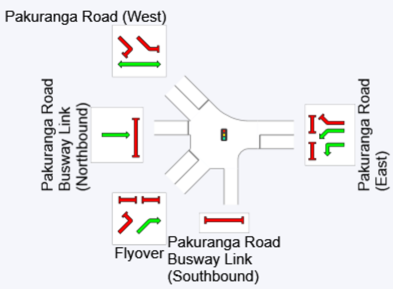
### Phase Timing Summary

| Phase | A | B | C | D |
|---|---|---|---|---|
| Phase Change Time (sec) | 0 | 72 | 97 | 120 |
| Green Time (sec) | 66 | 19 | 17 | 24 |
| Phase Time (sec) | 72 | 25 | 23 | 30 |
| Phase Split | 48% | 17% | 15% | 20% |

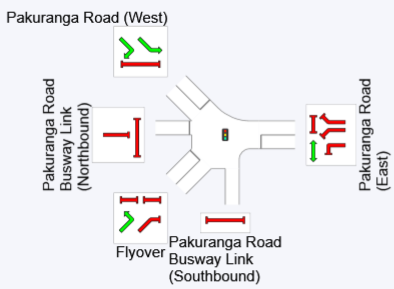
See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified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

### Output Phase Sequence

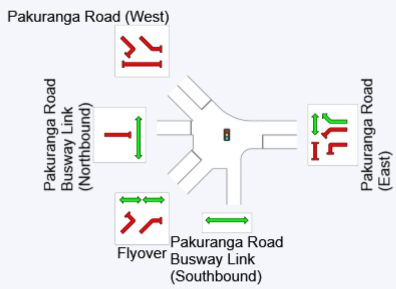
**Phase A** **REF**



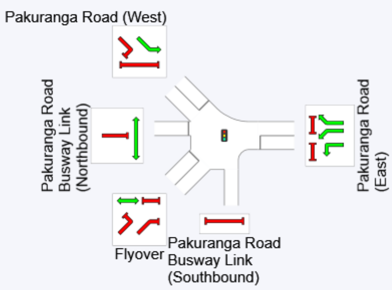

**Phase B**




**Phase C**




**Phase D**




REF: Reference Phase
VAR: Variable Phase

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

# CCG PHASING SUMMARY

## Common Control Group: CCG3 [Aylesbury/ WR/ Reeves Rd] Network: N101 [PM (Network Folder: General)]

EQUISAT (Fixed-Time/SCATS) Isolated     Cycle Time = 108 seconds (CCG User-Given Phase Times)

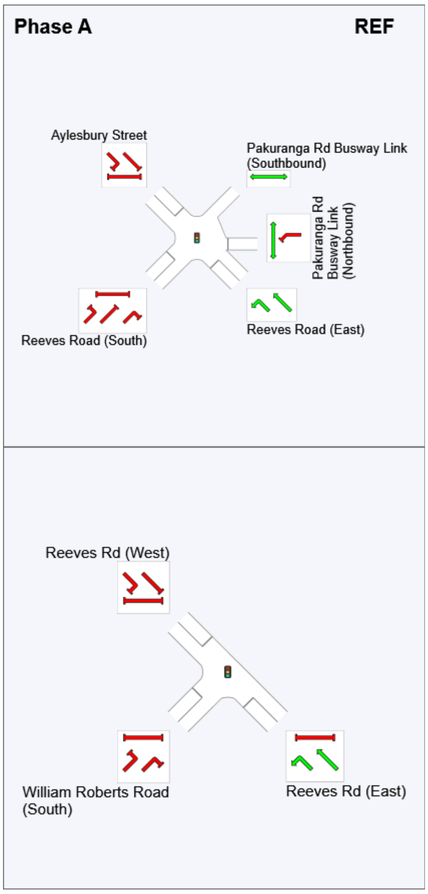
**Timings based on settings in the Network Timing dialog**
**Phase Times specified by the user**
**Phase Sequence: CCG Phasing**
**Reference Phase: Phase A**
**Input Phase Sequence: A, B, C, C2, D**
**Output Phase Sequence: A, B, C, C2, D**

## Phase Timing Summary (CCG)

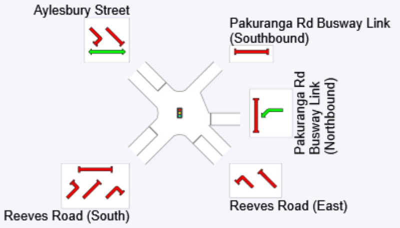
| Phase | A | B | C | C2 | D |
|---|---|---|---|---|---|
| Phase Change Time (sec) | 0 | 18 | 35 | 58 | 73 |
| Green Time (sec) | 12 | 11 | 19 | 9 | 31 |
| Phase Time (sec) | 18 | 15 | 25 | 13 | 37 |
| Phase Split | 17% | 14% | 23% | 12% | 34% |

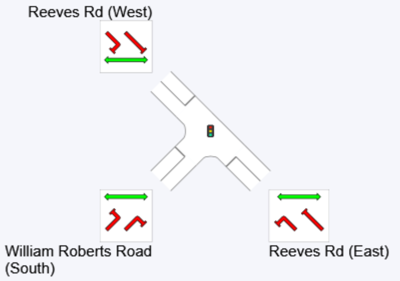
See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified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

## Output Phase Sequence (CCG)

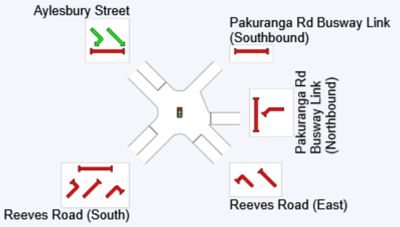


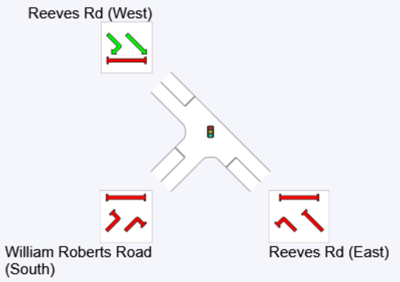
**Phase B**



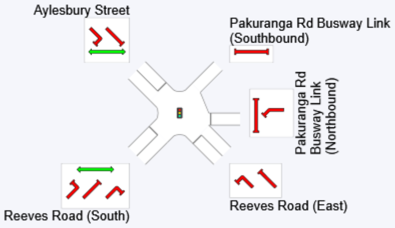



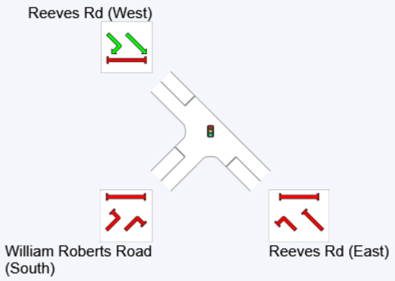

**Phase C**



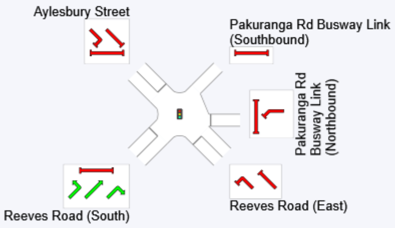



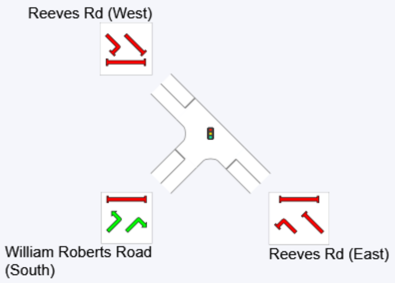
## Phase C2




## Phase D




REF: Reference Phase
VAR: Variable Phase

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

# PHASING SUMMARY

**Site: 4.0 [4.0 Palm Ave / Aylesbury St (Site Folder: PM)]**

**Network: N101 [PM (Network Folder: General)]**

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated    Cycle Time = 149 seconds (Site User-Given Phase Times)

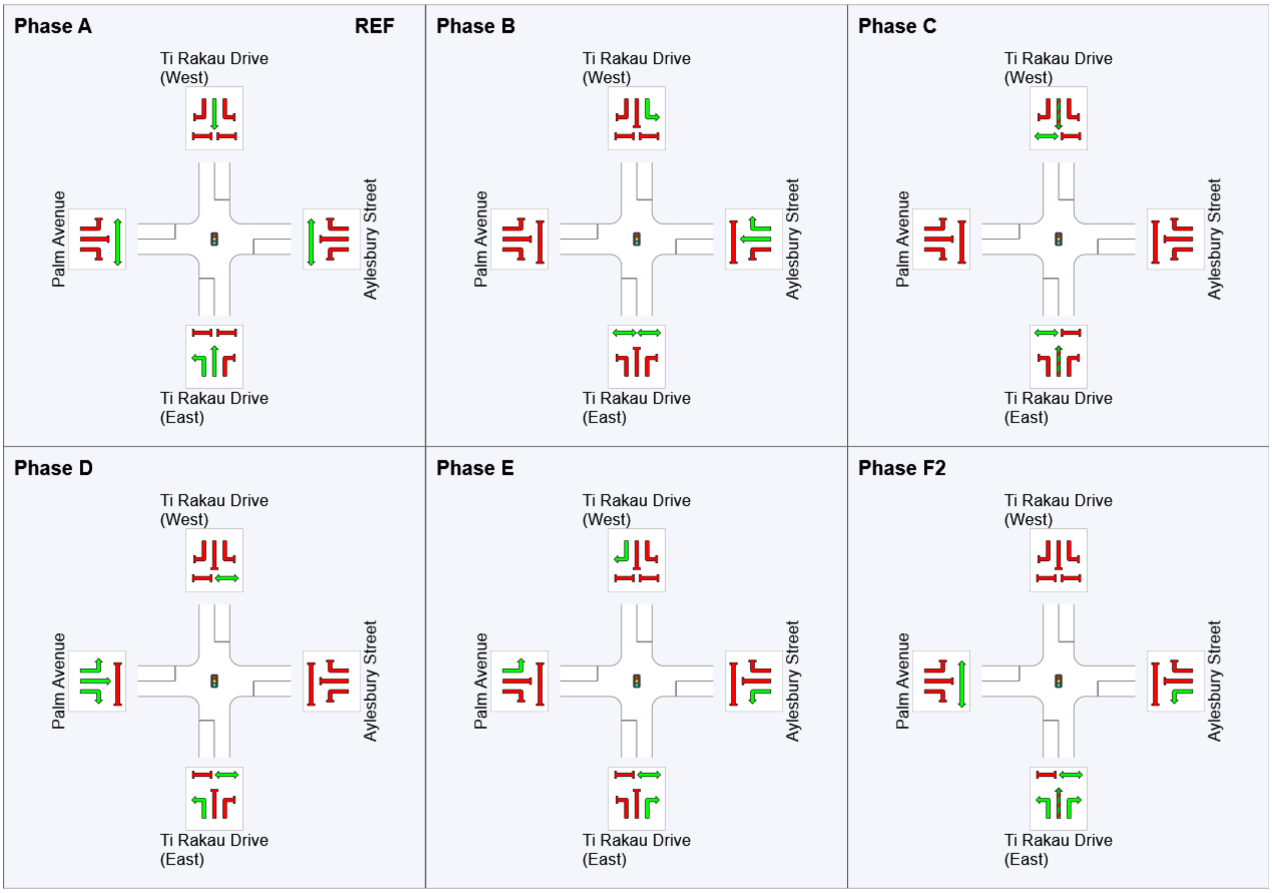
**Timings based on settings in the Site Phasing & Timing dialog**
**Phase Times specified by the user**
**Phase Sequence: Variable Phasing**
**Reference Phase: Phase A**
**Input Phase Sequence: A, B, C, D, E, F2**
**Output Phase Sequence: A, B, C, D, E, F2**

## Phase Timing Summary

| Phase | A | B | C | D | E | F2 |
|---|---|---|---|---|---|---|
| Phase Change Time (sec) | 0 | 29 | 64 | 86 | 114 | 129 |
| Green Time (sec) | 23 | 29 | 16 | 22 | 9 | 14 |
| Phase Time (sec) | 29 | 35 | 22 | 28 | 15 | 20 |
| Phase Split | 19% | 23% | 15% | 19% | 10% | 13% |

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

## Output Phase Sequence




REF: Reference Phase
VAR: Variable Phase

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

# PHASING SUMMARY

## Site: 5.0 [5.0 Pakuranga Highway / Reeves Rd (Site Folder: PM)]

## Network: N101 [PM (Network Folder: General)]

Site Category: (None)
Single Point Interchange (Signals) - EQUISAT (Fixed-Time/SCATS) Coordinated    Cycle Time = 131 seconds (Site User-Given Phase Times)

**Timings based on settings in the Site Phasing & Timing dialog**
**Phase Times specified by the user**
**Phase Sequence: Variable Phasing**
**Reference Phase: Phase A**
**Input Phase Sequence: A, B, C, D, E, F**
**Output Phase Sequence: A, B, C, D, E, F**

### Phase Timing Summary

| Phase | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| Phase Change Time (sec) | 0 | 17 | 30 | 54 | 91 | 103 |
| Green Time (sec) | 11 | 7 | 18 | 31 | 6 | 23 |
| Phase Time (sec) | 17 | 13 | 24 | 37 | 11 | 29 |
| Phase Split | 13% | 10% | 18% | 28% | 8% | 22% |

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

### Output Phase Sequence


REF: Reference Phase
VAR: Variable Phase

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

# CCG PHASING SUMMARY

## Common Control Group: CCG2 [WRR / Mattson]

## Network: N101 [PM (Network Folder: General)]

EQUISAT (Fixed-Time/SCATS) Isolated     Cycle Time = 69 seconds (CCG User-Given Phase Times)

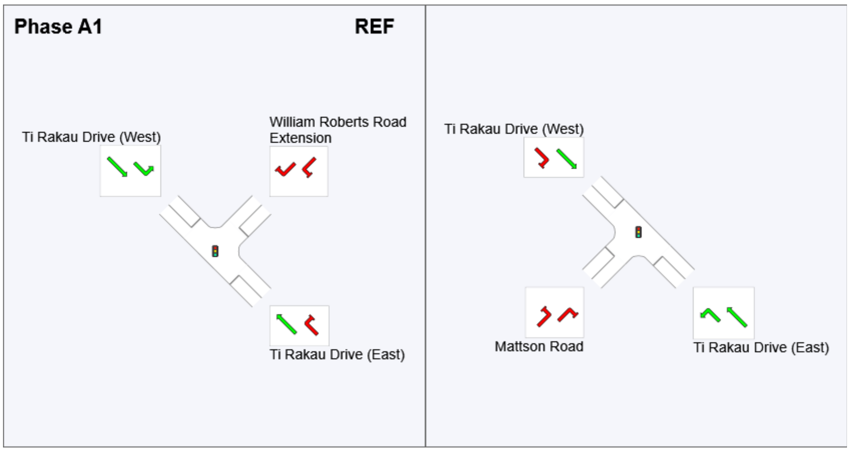
**Timings based on settings in the Network Timing dialog**
**Phase Times specified by the user**
**Phase Sequence: CCG Phasing**
**Reference Phase: Phase A1**
**Input Phase Sequence: A1, B, C, D**
**Output Phase Sequence: A1, B, C, D**

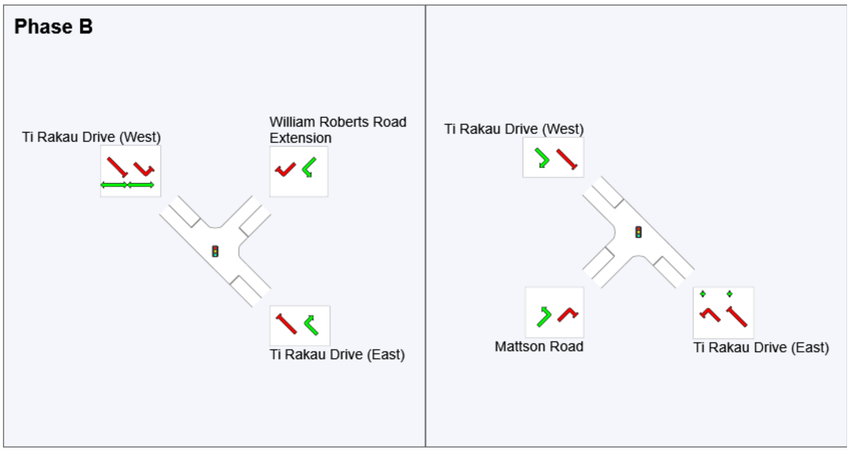
## Phase Timing Summary (CCG)

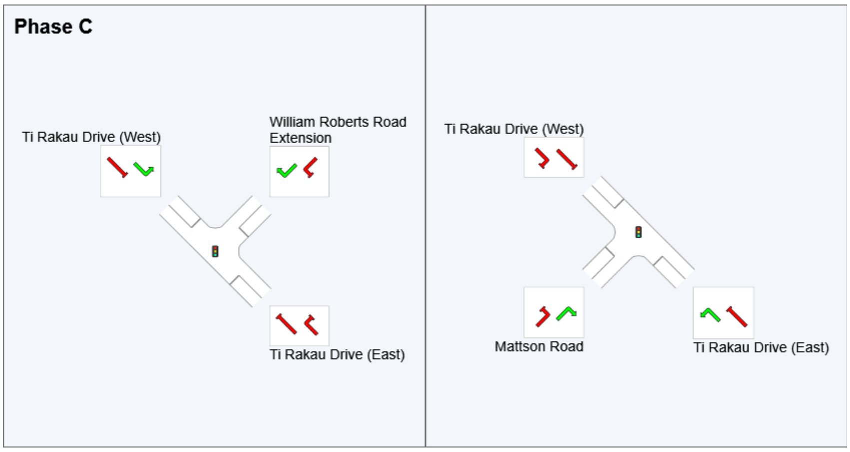
| Phase | A1 | B | C | D |
|---|---|---|---|---|
| Phase Change Time (sec) | 0 | 13 | 37 | 48 |
| Green Time (sec) | 8 | 18 | 5 | 16 |
| Phase Time (sec) | 14 | 24 | 10 | 21 |
| Phase Split | 20% | 35% | 14% | 30% |

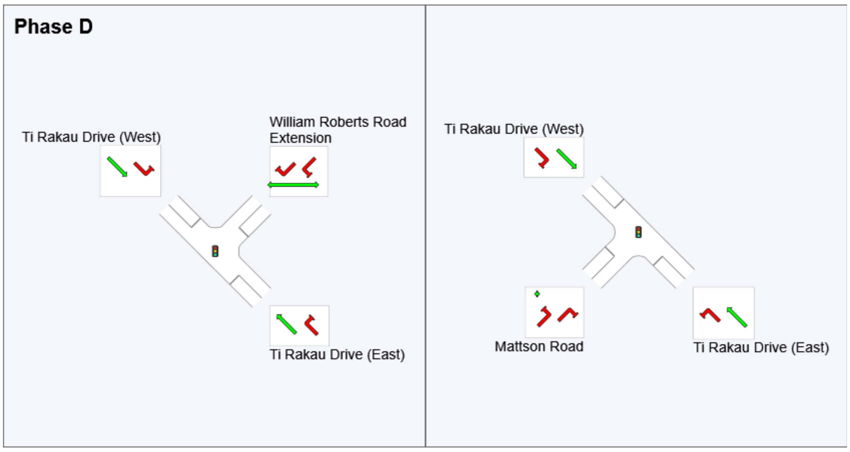
See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified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

## Output Phase Sequence (CCG)






REF: Reference Phase
VAR: Variable Phase

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

# PHASING SUMMARY

## Site: 8.1 [8.1 U-turn - West of Marriot Rd (Site Folder: PM)]

## Network: N101 [PM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated    Cycle Time = 40 seconds (Site Practical Cycle Time)

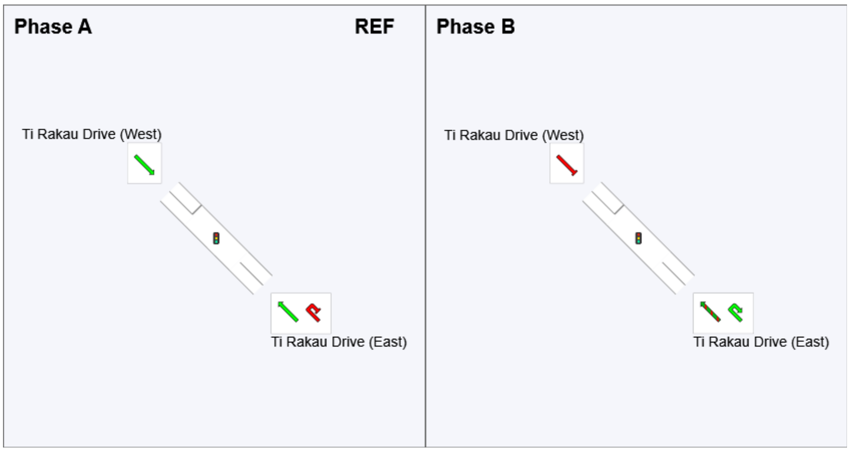
**Timings based on settings in the Site Phasing & Timing dialog**
**Phase Times determined by the program**
**Downstream lane blockage effects included in determining phase times**
**Phase Sequence: Opposed Turns**
**Reference Phase: Phase A**
**Input Phase Sequence: A, B**
**Output Phase Sequence: A, B**

### Phase Timing Summary

| Phase | A | B |
|---|---|---|
| Phase Change Time (sec) | 0 | 28 |
| Green Time (sec) | 22 | 6 |
| Phase Time (sec) | 28 | 12 |
| Phase Split | 70% | 30% |

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

### Output Phase Sequence




REF: Reference Phase
VAR: Variable Phase

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

# PHASING SUMMARY

## Site: 10.1 [10.1 U-turn - East of Edgewater Dr (West) (Site Folder: PM)]

## Network: N101 [PM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated    Cycle Time = 40 seconds (Site Practical Cycle Time)

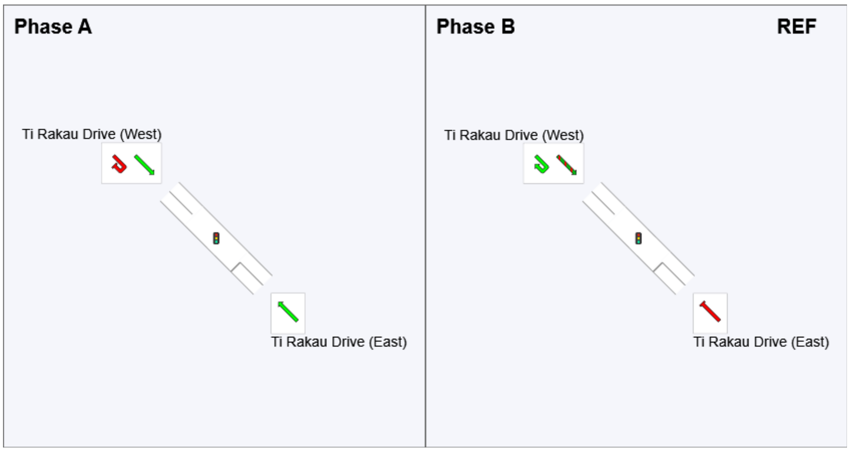
**Timings based on settings in the Site Phasing & Timing dialog**
**Phase Times determined by the program**
**Downstream lane blockage effects included in determining phase times**
**Phase Sequence: Opposed Turns**
**Reference Phase: Phase B**
**Input Phase Sequence: A, B**
**Output Phase Sequence: A, B**

## Phase Timing Summary

| Phase | A | B |
|---|---|---|
| Phase Change Time (sec) | 12 | 0 |
| Green Time (sec) | 22 | 6 |
| Phase Time (sec) | 28 | 12 |
| Phase Split | 70% | 30% |

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

## Output Phase Sequence




REF: Reference Phase
VAR: Variable Phase

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

# PHASING SUMMARY

## Site: 13.0 [13.0 Gossamer Dr / Ti Rakau Dr (Site Folder: PM)]  Network: N101 [PM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated  Cycle Time = 150 seconds (Site User-Given Phase Times)

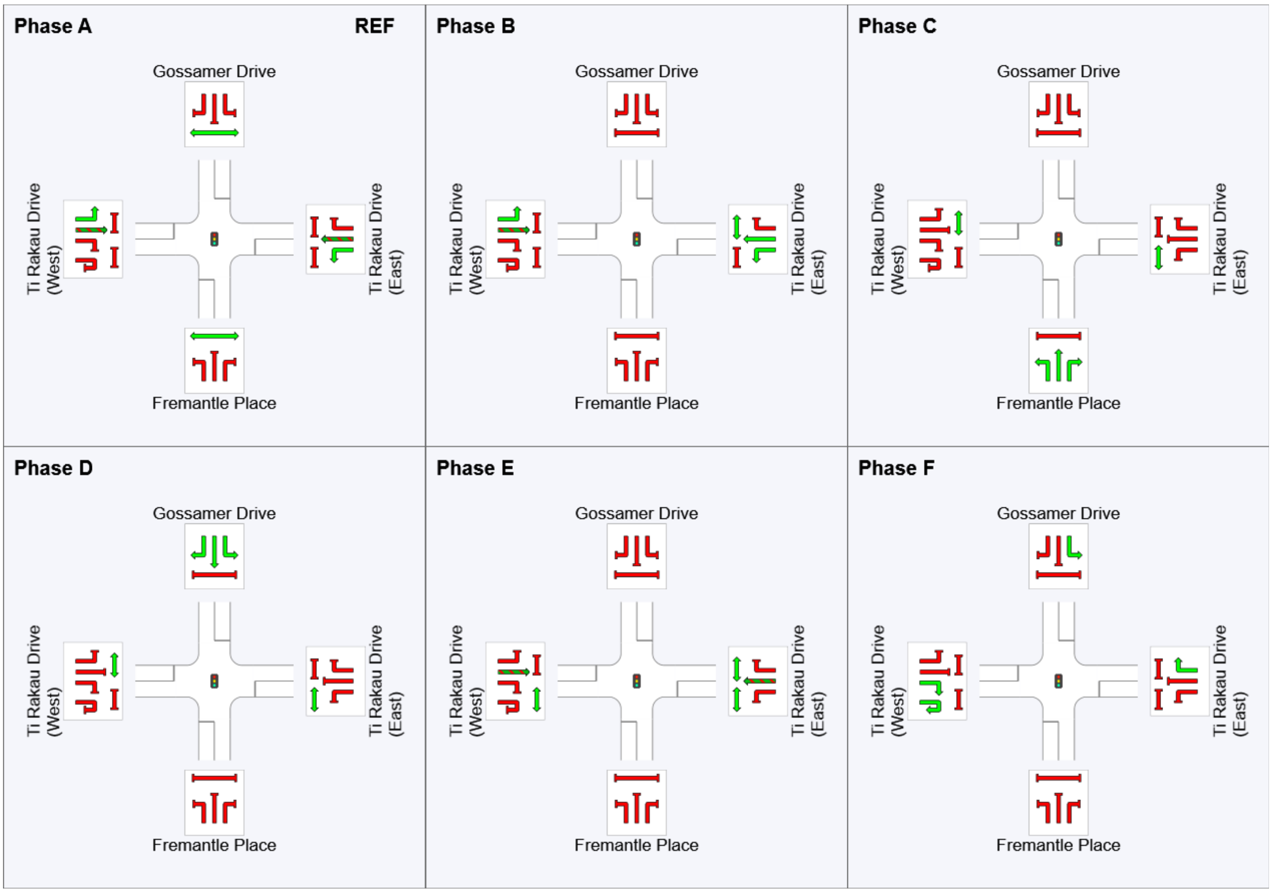
**Timings based on settings in the Site Phasing & Timing dialog**
**Phase Times specified by the user**
**Phase Sequence: Variable Phasing**
**Reference Phase: Phase A**
**Input Phase Sequence: A, B, C, D, E, F**
**Output Phase Sequence: A, B, C, D, E, F**

### Phase Timing Summary

| Phase | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| Phase Change Time (sec) | 0 | 57 | 78 | 91 | 102 | 122 |
| Green Time (sec) | 51 | 15 | 7 | 6 | 15 | 22 |
| Phase Time (sec) | 57 | 21 | 12 | 11 | 21 | 28 |
| Phase Split | 38% | 14% | 8% | 7% | 14% | 19% |

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

### Output Phase Sequence




REF: Reference Phase
VAR: Variable Phase

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

# Appendix K

**EB2/EB3R Final Scenario – Lane performance Summaries**

# LANE SUMMARY

## Site: 8.1 [8.1 U-turn - West of Marriot Rd (Site Folder: AM)]

## Network: N101 [AM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated    Cycle Time = 30 seconds (Site Practical Cycle Time)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast: Ti Rakau Drive (East) | | | | | | | | | | | | | | | |
| Lane 1 | 780 | 11.0 | 780 | 11.0 | 1810 | 0.431 | 100 | 0.1 | LOS A | 0.0 | 0.0 | Full | 147 | 0.0 | 0.0 |
| Lane 2 | 780 | 11.0 | 780 | 11.0 | 1810 | 0.431 | 100 | 0.1 | LOS A | 0.0 | 0.0 | Full | 147 | 0.0 | 0.0 |
| Lane 3 | 68 | 5.9 | 68 | 5.9 | 267 | 0.255 | 100 | 18.2 | LOS B | 0.8 | 6.2 | Short | 14 | 0.0 | NA |
| Lane 4 (B) | 25 | 100.0 | 25 | 100.0 | 478 | 0.052 | 100 | 2.1 | LOS A | 0.1 | 0.9 | Full | 147 | 0.0 | 0.0 |
| Approach | 1652 | 12.2 | 1652 | 12.2 | | 0.431 | | 0.8 | LOS A | 0.8 | 6.2 | | | | |
| NorthWest: Ti Rakau Drive (West) | | | | | | | | | | | | | | | |
| Lane 1 | 533 | 14.2 | 533 | 14.2 | 711 | 0.750 | 100 | 11.1 | LOS B | 7.2 | 56.7 | Full | 73 | 0.0 | 0.0 |
| Lane 2 | 533 | 14.2 | 533 | 14.2 | 711 | 0.750 | 100 | 11.1 | LOS B | 7.2 | 56.7 | Full | 73 | 0.0 | 0.0 |
| Lane 3 (B) | 13 | 100.0 | 13 | 100.0 | 478 | 0.027 | 100 | 2.1 | LOS A | 0.0 | 0.5 | Full | 73 | 0.0 | 0.0 |
| Approach | 1079 | 15.2 | 1079 | 15.2 | | 0.750 | | 11.0 | LOS B | 7.2 | 56.7 | | | | |
| Intersection | 2731 | 13.4 | 2731 | 13.4 | | 0.750 | | 4.8 | LOS A | 7.2 | 56.7 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

**Approach Lane Flows (veh/h)**

SouthEast: Ti Rakau Drive (East)

| Mov. From SE To Exit: | T1 NW | U SE | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 780 | - | 780 | 11.0 | 1810 | 0.431 | 100 | NA | NA |
| Lane 2 | 780 | - | 780 | 11.0 | 1810 | 0.431 | 100 | NA | NA |
| Lane 3 | - | 68 | 68 | 5.9 | 267 | 0.255 | 100 | 0.0 | 2 |
| Lane 4 | 25 | - | 25 | 100.0 | 478 | 0.052 | 100 | NA | NA |
| Approach | 1584 | 68 | 1652 | 12.2 | | 0.431 | | | |

NorthWest: Ti Rakau Drive (West)

| Mov. From NW To Exit: | T1 SE | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|
| Lane 1 | 533 | 533 | 14.2 | 711 | 0.750 | 100 | NA | NA |
| Lane 2 | 533 | 533 | 14.2 | 711 | 0.750 | 100 | NA | NA |
| Lane 3 | 13 | 13 | 100.0 | 478 | 0.027 | 100 | NA | NA |
| Approach | 1079 | 1079 | 15.2 | | 0.750 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 2731 | 13.4 | 0.750 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

| Merge Analysis | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast Exit: Ti Rakau Drive (East)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | | |
| NorthWest Exit: Ti Rakau Drive (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | | |

# LANE SUMMARY

## Site: 10.1 [10.1 U-turn - East of Edgewater Dr (West) (Site Folder: AM)]

## Network: N101 [AM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated    Cycle Time = 40 seconds (Site Practical Cycle Time)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast: Ti Rakau Drive (East) | | | | | | | | | | | | | | | |
| Lane 1 | 771 | 10.7 | 771 | 10.7 | 998 | 0.773 | 100 | 10.6 | LOS B | 12.2 N4 | 93.5 N4 | Full | 64 | 0.0 | 50.0 |
| Lane 2 | 771 | 10.7 | 771 | 10.7 | 998 | 0.773 | 100 | 10.6 | LOS B | 12.2 N4 | 93.5 N4 | Full | 64 | 0.0 | 50.0 |
| Lane 3 (B) | 25 | 100.0 | 25 | 100.0 | 657 | 0.038 | 100 | 0.2 | LOS A | 0.0 | 0.1 | Full | 64 | 0.0 | 0.0 |
| Approach | 1567 | 12.1 | 1567 | 12.1 | | 0.773 | | 10.5 | LOS B | 12.2 | 93.5 | | | | |
| NorthWest: Ti Rakau Drive (West) | | | | | | | | | | | | | | | |
| Lane 1 | 537 | 13.6 | 537 | 13.6 | 1783 | 0.302 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 81 | 0.0 | 0.0 |
| Lane 2 | 538 | 13.6 | 538 | 13.6 | 1783 | 0.302 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 81 | 0.0 | 0.0 |
| Lane 3 | 112 | 10.7 | 112 | 10.7 | 194 | 0.576 | 100 | 25.6 | LOS C | 2.1 | 16.0 | Short | 15 | 0.0 | NA |
| Lane 4 (B) | 13 | 100.0 | 13 | 100.0 | 657 | 0.020 | 100 | 0.2 | LOS A | 0.0 | 0.1 | Full | 81 | 0.0 | 0.0 |
| Approach | 1200 | 14.3 | 1200 | 14.3 | | 0.576 | | 2.4 | LOS A | 2.1 | 16.0 | | | | |
| Intersection | 2767 | 13.0 | 2767 | 13.0 | | 0.773 | | 7.0 | LOS A | 12.2 | 93.5 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N4 Average back of queue has been restricted to the available queue storage space.

**Approach Lane Flows (veh/h)**

SouthEast: Ti Rakau Drive (East)

| Mov. From SE To Exit: | T1 NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|
| Lane 1 | 771 | 771 | 10.7 | 998 | 0.773 | 100 | NA | NA |
| Lane 2 | 771 | 771 | 10.7 | 998 | 0.773 | 100 | NA | NA |
| Lane 3 | 25 | 25 | 100.0 | 657 | 0.038 | 100 | NA | NA |
| Approach | 1567 | 1567 | 12.1 | | 0.773 | | | |

NorthWest: Ti Rakau Drive (West)

| Mov. From NW To Exit: | T1 SE | U NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 537 | - | 537 | 13.6 | 1783 | 0.302 | 100 | NA | NA |
| Lane 2 | 538 | - | 538 | 13.6 | 1783 | 0.302 | 100 | NA | NA |
| Lane 3 | - | 112 | 112 | 10.7 | 194 | 0.576 | 100 | 20.7 | 2 |
| Lane 4 | 13 | - | 13 | 100.0 | 657 | 0.020 | 100 | NA | NA |
| Approach | 1088 | 112 | 1200 | 14.3 | | 0.576 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 2767 | 13.0 | 0.773 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

| Merge Analysis | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Exit Lane Number | Short Lane Length | Percent Opng in Lane | Opposing Flow Rate | | Critical Gap | Follow-up Headway | Lane Flow Rate | Capacity | Deg. Satn | Min. Delay | Merge Delay |
| | | m | % | veh/h | pcu/h | sec | sec | veh/h | veh/h | v/c | sec | sec |
| SouthEast Exit: Ti Rakau Drive (East)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | | |
| NorthWest Exit: Ti Rakau Drive (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | | |

# LANE SUMMARY

## Site: 13.0 [13.0 Gossamer Dr / Ti Rakau Dr (Site Folder: AM)]

## Network: N101 [AM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated    Cycle Time = 150 seconds (Site User-Given Phase Times)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **South: Fremantle Place** | | | | | | | | | | | | | | | |
| Lane 1 | 20 | 10.0 | 20 | 10.0 | 93 | 0.215 | 100 | 81.5 | LOS F | 1.3 | 10.0 | Short | 9 | 0.0 | NA |
| Lane 2 | 21 | 4.8 | 21 | 4.8 | 98 | 0.213 | 100 | 79.0 | LOS E | 1.4 | 10.0 | Full | 285 | 0.0 | 0.0 |
| Approach | 41 | 7.3 | 41 | 7.3 | | 0.215 | | 80.2 | LOS F | 1.4 | 10.0 | | | | |
| **East: Ti Rakau Drive (East)** | | | | | | | | | | | | | | | |
| Lane 1 | 769 | 10.6 | 769 | 10.6 | 796 | 0.967 | 100 | 77.1 | LOS E | 63.7 | 486.1 | Full | 636 | 0.0 | 0.0 |
| Lane 2 | 739 | 10.8 | 739 | 10.8 | 764 [1] | 0.967 | 100 | 76.8 | LOS E | 60.1 | 459.5 | Full | 636 | 0.0 | 0.0 |
| Lane 3 (B) | 28 | 100.0 | 28 | 100.0 | 204 | 0.137 | 100 | 34.7 | LOS C | 1.2 | 15.0 | Short | 60 | 0.0 | NA |
| Lane 4 | 172 | 8.4 | 172 | 8.4 | 244 | 0.705 | 82 [6] | 73.4 | LOS E | 11.1 | 83.6 | Short | 150 | 0.0 | NA |
| Lane 5 | 210 | 8.4 | 210 | 8.4 | 244 | 0.860 | 100 | 82.5 | LOS F | 14.9 | 111.9 | Short | 103 | 0.0 | NA |
| Approach | 1918 | 11.5 | 1918 | 11.5 | | 0.967 | | 76.6 | LOS E | 63.7 | 486.1 | | | | |
| **North: Gossamer Drive** | | | | | | | | | | | | | | | |
| Lane 1 | 359 | 9.5 | 359 | 9.5 | 365 | 0.982 | 100 | 101.3 | LOS F | 24.8 | 187.8 | Short | 150 | 0.0 | NA |
| Lane 2 | 358 | 9.5 | 358 | 9.5 | 365 [1] | 0.982 | 100 | 101.0 | LOS F | 24.8 | 187.6 | Full | 1010 | 0.0 | 0.0 |
| Lane 3 | 41 | 14.6 | 41 | 14.6 | 124 | 0.330 | 100 | 77.5 | LOS E | 2.7 | 20.9 | Short | 28 | 0.0 | NA |
| Approach | 758 | 9.8 | 758 | 9.8 | | 0.982 | | 99.9 | LOS F | 24.8 | 187.8 | | | | |
| **West: Ti Rakau Drive (West)** | | | | | | | | | | | | | | | |
| Lane 1 | 31 | 6.5 | 31 | 6.5 | 718 | 0.043 | 100 | 32.9 | LOS C | 1.2 | 8.8 | Short | 28 | 0.0 | NA |
| Lane 2 | 505 | 13.7 | 505 | 13.7 | 542 [1] | 0.932 | 100 | 74.5 | LOS E | 38.4 | 300.7 | Full | 479 | 0.0 | 0.0 |
| Lane 3 | 473 | 13.7 | 473 | 13.7 | 507 [1] | 0.932 | 100 | 74.4 | LOS E | 35.5 | 277.5 | Full | 479 | 0.0 | 0.0 |
| Lane 4 | 53 | 7.5 | 53 | 7.5 | 194 | 0.274 | 100 | 69.3 | LOS E | 3.2 | 23.7 | Short | 23 | 0.0 | NA |
| Lane 5 (B) | 27 | 100.0 | 27 | 100.0 | 207 | 0.130 | 100 | 34.6 | LOS C | 1.1 | 14.4 | Full | 479 | 0.0 | 0.0 |
| Approach | 1089 | 15.3 | 1089 | 15.3 | | 0.932 | | 72.0 | LOS E | 38.4 | 300.7 | | | | |
| Intersection | 3806 | 12.2 | 3806 | 12.2 | | 0.982 | | 80.0 | LOS E | 63.7 | 486.1 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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

**Approach Lane Flows (veh/h)**

South: Fremantle Place

| Mov. From S To Exit: | L2 W | T1 N | R2 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 20 | - | - | 20 | 10.0 | 93 | 0.215 | 100 | 24.7 | 2 |
| Lane 2 | - | 10 | 11 | 21 | 4.8 | 98 | 0.213 | 100 | NA | NA |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Approach | 20 | 10 | 11 | 41 | 7.3 | | 0.215 | | | |

East: Ti Rakau Drive (East)

| Mov. From E To Exit: | L2 S | T1 W | R2 N | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 15 | 754 | - | 769 | 10.6 | 796 | 0.967 | 100 | NA | NA |
| Lane 2 | - | 739 | - | 739 | 10.8 | 764 [1] | 0.967 | 100 | NA | NA |
| Lane 3 | - | 28 | - | 28 | 100.0 | 204 | 0.137 | 100 | 0.0 | 2 |
| Lane 4 | - | - | 172 | 172 | 8.4 | 244 | 0.705 | 82 [6] | 0.0 | 2 |
| Lane 5 | - | - | 210 | 210 | 8.4 | 244 | 0.860 | 100 | 22.5 | 4 |
| Approach | 15 | 1521 | 382 | 1918 | 11.5 | | 0.967 | | | |

North: Gossamer Drive

| Mov. From N To Exit: | L2 E | T1 S | R2 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 359 | - | - | 359 | 9.5 | 365 | 0.982 | 100 | 35.6 | 2 |
| Lane 2 | 358 | - | - | 358 | 9.5 | 365 [1] | 0.982 | 100 | NA | NA |
| Lane 3 | - | 10 | 31 | 41 | 14.6 | 124 | 0.330 | 100 | 0.0 | 2 |
| Approach | 717 | 10 | 31 | 758 | 9.8 | | 0.982 | | | |

West: Ti Rakau Drive (West)

| Mov. From W To Exit: | L2 N | T1 E | R2 S | U W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 31 | - | - | - | 31 | 6.5 | 718 | 0.043 | 100 | 0.0 | 2 |
| Lane 2 | - | 505 | - | - | 505 | 13.7 | 542 [1] | 0.932 | 100 | NA | NA |
| Lane 3 | - | 473 | - | - | 473 | 13.7 | 507 [1] | 0.932 | 100 | NA | NA |
| Lane 4 | - | - | 10 | 43 | 53 | 7.5 | 194 | 0.274 | 100 | 17.7 | 3 |
| Lane 5 | - | 27 | - | - | 27 | 100.0 | 207 | 0.130 | 100 | NA | NA |
| Approach | 31 | 1005 | 10 | 43 | 1089 | 15.3 | | 0.932 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 3806 | 12.2 | 0.982 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

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

6 Lane under-utilisation due to downstream effects

**Merge Analysis**

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South Exit: Fremantle Place<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| East Exit: Ti Rakau Drive (East)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| North Exit: Gossamer Drive<br>Merge Type: **Zipper** | | | | | | | | | | | | |
| Exit Short Lane | 1 | 150 | 50.0 | 105 | 109 | 2.50 | 2.00 | 213 | 1675 | 0.127 | 0.0 | 0.0 |
| Merge Lane | 2 | - | 50.0 | 107 | 111 | 2.50 | 2.00 | 210 | 1674 | 0.125 | 0.0 | 0.0 |
| West Exit: Ti Rakau Drive (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |

| | | |
|---|---|---|
| Full Length Lane | 1 | Merge Analysis not applied. |
| Full Length Lane | 2 | Merge Analysis not applied. |
| Full Length Lane | 3 | Merge Analysis not applied. |

# LANE SUMMARY

## Site: 1.0 [1.0 Pakuranga Rd / Ti Rakau Dr (Site Folder: AM)]

## Network: N101 [AM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated    Cycle Time = 100 seconds (Site Practical Cycle Time)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total | HV ] | ARRIVAL FLOWS [ Total | HV ] | Cap. | Deg. Satn | Lane Util. | Aver. Delay | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] | Lane Config | Lane Length | Cap. Adj. | Prob. Block. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | veh/h | % | veh/h | % | veh/h | v/c | % | sec | | | m | | m | % | % |
| **South: Ti Rakau Drive** | | | | | | | | | | | | | | | |
| Lane 1 | 446 | 9.3 | 446 | 9.3 | 554 | 0.804 | 100 | 42.5 | LOS D | 19.4 | 146.4 | Full | 174 | 0.0 | 0.0 |
| Lane 2 | 446 | 9.3 | 446 | 9.3 | 554 | 0.804 | 100 | 42.5 | LOS D | 19.4 | 146.4 | Full | 174 | 0.0 | 0.0 |
| Lane 3 | 256 | 8.6 | 256 | 8.6 | 557 | 0.460 | 100 | 34.0 | LOS C | 9.0 | 67.5 | Short | 87 | 0.0 | NA |
| Lane 4 (B) | 53 | 100.0 | 53 | 100.0 | 263 | 0.202 | 100 | 28.3 | LOS C | 1.4 | 17.9 | Full | 174 | 0.0 | 0.0 |
| Approach | 1200 | 13.2 | 1200 | 13.2 | | 0.804 | | 40.1 | LOS D | 19.4 | 146.4 | | | | |
| **East: Pakuranga Road (East)** | | | | | | | | | | | | | | | |
| Lane 1 | 94 | 6.4 | 84 | 6.4 | 459 | 0.183 | 100 | 35.7 | LOS D | 2.9 | 21.2 | Short | 21 | 0.0 | NA |
| Lane 2 | 372 | 4.3 | 333 | 4.4 | 416[1] | 0.801 | 100 | 40.8 | LOS D | 14.3 | 104.0 | Full | 98 | 0.0 | 20.4 |
| Lane 3 | 438 | 4.3 | 393 | 4.4 | 490 | 0.801 | 100 | 41.5 | LOS D | 17.3 | 126.0 | Full | 98 | 0.0 | 38.0 |
| Approach | 904 | 4.5 | 810[N1] | 4.6 | | 0.801 | | 40.6 | LOS D | 17.3 | 126.0 | | | | |
| **West: Pakuranga Road (West)** | | | | | | | | | | | | | | | |
| Lane 1 (B) | 23 | 100.0 | 23 | 100.0 | 263 | 0.087 | 100 | 27.4 | LOS C | 0.6 | 7.3 | Full | 380 | 0.0 | 0.0 |
| Lane 2 | 296 | 5.7 | 296 | 5.7 | 486 | 0.609 | 100 | 35.5 | LOS D | 11.5 | 84.6 | Full | 380 | 0.0 | 0.0 |
| Lane 3 | 296 | 5.7 | 296 | 5.7 | 486 | 0.609 | 100 | 35.5 | LOS D | 11.5 | 84.6 | Full | 380 | 0.0 | 0.0 |
| Lane 4 | 319 | 17.9 | 319 | 17.9 | 393 | 0.810 | 100 | 49.1 | LOS D | 14.6 | 117.6 | Short | 178 | 0.0 | NA |
| Lane 5 | 319 | 17.9 | 319 | 17.9 | 393 | 0.810 | 100 | 49.1 | LOS D | 14.6 | 117.6 | Short | 105 | 0.0 | NA |
| Approach | 1252 | 13.7 | 1252 | 13.7 | | 0.810 | | 42.3 | LOS D | 14.6 | 117.6 | | | | |
| Intersection | 3356 | 11.0 | 3262[N1] | 11.3 | | 0.810 | | 41.0 | LOS D | 19.4 | 146.4 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

**Approach Lane Flows (veh/h)**

South: Ti Rakau Drive

| Mov. From S To Exit: | L2 W | R2 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 446 | - | 446 | 9.3 | 554 | 0.804 | 100 | NA | NA |
| Lane 2 | 446 | - | 446 | 9.3 | 554 | 0.804 | 100 | NA | NA |
| Lane 3 | - | 256 | 256 | 8.6 | 557 | 0.460 | 100 | 0.0 | 2 |
| Lane 4 | 53 | - | 53 | 100.0 | 263 | 0.202 | 100 | NA | NA |
| Approach | 944 | 256 | 1200 | 13.2 | | 0.804 | | | |

East: Pakuranga Road (East)

| Mov. | L2 | T1 | Total | %HV | | Deg. | Lane | Prob. | Ov. |
|---|---|---|---|---|---|---|---|---|---|

| From E<br>To Exit: | S | W | Total | %HV | Cap.<br>veh/h | Satn<br>v/c | Util.<br>% | SL Ov.<br>% | Lane<br>No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 84 | - | 84 | 6.4 | 459 | 0.183 | 100 | 16.0 | 2 |
| Lane 2 | - | 333 | 333 | 4.4 | 416[1] | 0.801 | 100 | NA | NA |
| Lane 3 | - | 393 | 393 | 4.4 | 490 | 0.801 | 100 | NA | NA |
| Approach | 84 | 725 | 810 | 4.6 | | 0.801 | | | |
| West: Pakuranga Road (West) | | | | | | | | | |
| Mov.<br>From W<br>To Exit: | T1<br><br>E | R2<br><br>S | Total | %HV | Cap.<br>veh/h | Deg.<br>Satn<br>v/c | Lane<br>Util.<br>% | Prob.<br>SL Ov.<br>% | Ov.<br>Lane<br>No. |
| Lane 1 | - | 23 | 23 | 100.0 | 263 | 0.087 | 100 | NA | NA |
| Lane 2 | 296 | - | 296 | 5.7 | 486 | 0.609 | 100 | NA | NA |
| Lane 3 | 296 | - | 296 | 5.7 | 486 | 0.609 | 100 | NA | NA |
| Lane 4 | - | 319 | 319 | 17.9 | 393 | 0.810 | 100 | 0.0 | 3 |
| Lane 5 | - | 319 | 319 | 17.9 | 393 | 0.810 | 100 | 25.4 | 4 |
| Approach | 592 | 660 | 1252 | 13.7 | | 0.810 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 3262 | 11.3 | 0.810 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

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

## Merge Analysis

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South Exit: Ti Rakau Drive<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | | |
| East Exit: Pakuranga Road (East)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| West Exit: Pakuranga Road (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | | |

# LANE SUMMARY

## Site: 2.1 [2.1 Pakuranga Plaza / Pakuranga Rd (Site Folder: AM)]

## Network: N101 [AM (Network Folder: General)]

Site Category: (None)
Give-Way (Two-Way)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **East: Pakuranga Road (East)** | | | | | | | | | | | | | | | |
| Lane 1 | 479 | 4.5 | 428 | 4.6 | 1879 | 0.227 | 100 | 0.6 | LOS A | 0.0 | 0.0 | Full | 121 | 0.0 | 0.0 |
| Lane 2 | 480 | 4.7 | 428 | 4.7 | 1882 | 0.227 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 121 | 0.0 | 0.0 |
| Approach | 959 | 4.6 | 856 N1 | 4.6 | | 0.227 | | 0.3 | NA | 0.0 | 0.0 | | | | |
| **West: Pakuranga Road (West)** | | | | | | | | | | | | | | | |
| Lane 1 | 521 | 6.9 | 521 | 6.9 | 1856 | 0.281 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 108 | 0.0 | 0.0 |
| Lane 2 | 347 | 6.9 | 347 | 6.9 | 1238 | 0.281 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 108 | -33.3 N3 | 0.0 |
| Approach | 868 | 6.9 | 868 | 6.9 | | 0.281 | | 0.0 | NA | 0.0 | 0.0 | | | | |
| **SouthWest: Pakuranga Plaza** | | | | | | | | | | | | | | | |
| Lane 1 | 46 | 4.3 | 46 | 4.3 | 87 | 0.527 | 100 | 48.9 | LOS E | 1.1 | 7.7 | Full | 196 | -27.0 N7 | 0.0 |
| Approach | 46 | 4.3 | 46 | 4.3 | | 0.527 | | 48.9 | LOS E | 1.1 | 7.7 | | | | |
| Intersection | 1873 | 5.7 | 1770 N1 | 6.0 | | 0.527 | | 1.4 | NA | 1.1 | 7.7 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.
N3 Capacity Adjustment due to downstream lane blockage determined by the program.
N7 The capacity reduction has been determined from the queue blockage probability of a Site further downstream due to intermediate continuous lanes.

**Approach Lane Flows (veh/h)**

East: Pakuranga Road (East)

| Mov. From E To Exit: | L1 SW | T1 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 52 | 376 | 428 | 4.6 | 1879 | 0.227 | 100 | NA | NA |
| Lane 2 | - | 428 | 428 | 4.7 | 1882 | 0.227 | 100 | NA | NA |
| Approach | 52 | 804 | 856 | 4.6 | | 0.227 | | | |

West: Pakuranga Road (West)

| Mov. From W To Exit: | T1 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|
| Lane 1 | 521 | 521 | 6.9 | 1856 | 0.281 | 100 | NA | NA |
| Lane 2 | 347 | 347 | 6.9 | 1238 | 0.281 | 100 | NA | NA |
| Approach | 868 | 868 | 6.9 | | 0.281 | | | |

SouthWest: Pakuranga Plaza

| Mov. From SW To Exit: | L3 W | R1 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 12 | 34 | 46 | 4.3 | 87 | 0.527 | 100 | NA | NA |
| Approach | 12 | 34 | 46 | 4.3 | | 0.527 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 1770 | 6.0 | 0.527 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

**Merge Analysis**

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| East Exit: Pakuranga Road (East)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| West Exit: Pakuranga Road (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| SouthWest Exit: Pakuranga Plaza<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |

# LANE SUMMARY

## Site: 3.0 [3.0 Pakuranga Highway / Pakuranga Rd (Site Folder: AM)]

## Network: N101 [AM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated    Cycle Time = 150 seconds (Site User-Given Phase Times)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total | HV ] | ARRIVAL FLOWS [ Total | HV ] | Cap. | Deg. Satn | Lane Util. | Aver. Delay | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] | Lane Config | Lane Length | Cap. Adj. | Prob. Block. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | veh/h | % | veh/h | % | veh/h | v/c | % | sec | | | m | | m | % | % |
| **East: Pakuranga Road (East)** | | | | | | | | | | | | | | | |
| Lane 1 (B) | 28 | 100.0 | 28 | 100.0 | 665 | 0.042 | 100 | 17.8 | LOS B | 0.7 | 9.4 | Short | 24 | 0.0 | NA |
| Lane 2 | 1057 | 5.1 | 1057 | 5.1 | 1070 [1] | 0.988 | 100 | 74.8 | LOS E | 88.2 | 644.3 | Full | 183 | 0.0 | 100.0 |
| Lane 3 | 1100 | 5.1 | 1100 | 5.1 | 1114 | 0.988 | 100 | 75.0 | LOS E | 94.9 | 693.1 | Full | 183 | 0.0 | 100.0 |
| Lane 4 | 428 | 4.3 | 428 | 4.3 | 376 [1] | 1.138 | 100 | 212.5 | LOS F | 54.4 | 394.9 | Full | 183 | 0.0 | 87.5 [8] |
| Lane 5 | 428 | 4.3 | 428 | 4.3 | 376 [1] | 1.138 | 100 | 212.5 | LOS F | 54.4 | 394.9 | Short | 60 | 0.0 | NA |
| Approach | 3041 | 5.8 | 3041 | 5.8 | | 1.138 | | 113.1 | LOS F | 94.9 | 693.1 | | | | |
| **NorthWest: Pakuranga Road (West)** | | | | | | | | | | | | | | | |
| Lane 1 | 313 | 5.6 | 313 | 5.6 | 708 | 0.442 | 100 | 26.4 | LOS C | 11.5 | 84.1 | Full | 121 | 0.0 | 0.0 |
| Lane 2 | 313 | 5.6 | 313 | 5.6 | 708 | 0.442 | 100 | 26.4 | LOS C | 11.5 | 84.1 | Full | 121 | 0.0 | 33.3 [8] |
| Lane 3 | 288 | 9.4 | 288 | 9.4 | 346 | 0.832 | 100 | 73.3 | LOS E | 19.5 | 147.8 | Short | 98 | 0.0 | NA |
| Approach | 913 | 6.8 | 913 | 6.8 | | 0.832 | | 41.1 | LOS D | 19.5 | 147.8 | | | | |
| **West: Pakuranga Road Busway Link (Northbound)** | | | | | | | | | | | | | | | |
| Lane 1 (B) | 9 | 100.0 | 9 | 100.0 | 454 | 0.020 | 100 | 30.7 | LOS C | 0.4 | 4.7 | Full | 215 | 0.0 | 0.0 |
| Approach | 9 | 100.0 | 9 | 100.0 | | 0.020 | | 30.7 | LOS C | 0.4 | 4.7 | | | | |
| **SouthWest: Flyover** | | | | | | | | | | | | | | | |
| Lane 1 | 108 | 7.4 | 108 | 7.4 | 362 | 0.298 | 100 | 60.6 | LOS E | 6.0 | 44.9 | Short | 70 | 0.0 | NA |
| Lane 2 | 388 | 4.9 | 388 | 4.9 | 644 [1] | 0.603 | 100 | 42.9 | LOS D | 19.6 | 142.7 | Full | 1162 | 0.0 | 0.0 |
| Lane 3 | 435 | 4.9 | 435 | 4.9 | 721 | 0.603 | 100 | 44.1 | LOS D | 22.6 | 165.1 | Full | 1162 | 0.0 | 0.0 |
| Approach | 931 | 5.2 | 931 | 5.2 | | 0.603 | | 45.5 | LOS D | 22.6 | 165.1 | | | | |
| Intersection | 4894 | 6.0 | 4894 | 6.0 | | 1.138 | | 86.7 | LOS F | 94.9 | 693.1 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
8 Probability of Blockage has been set on the basis of a queue that overflows from a short lane.

**Approach Lane Flows (veh/h)**

East: Pakuranga Road (East)

| Mov. From E To Exit: | L2 S | L1 SW | R1 NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 28 | - | - | 28 | 100.0 | 665 | 0.042 | 100 | 0.0 | 2 |
| Lane 2 | - | 1057 | - | 1057 | 5.1 | 1070 [1] | 0.988 | 100 | NA | NA |
| Lane 3 | - | 1100 | - | 1100 | 5.1 | 1114 | 0.988 | 100 | NA | NA |
| Lane 4 | - | - | 428 | 428 | 4.3 | 376 [1] | 1.138 | 100 | NA | NA |
| Lane 5 | - | - | 428 | 428 | 4.3 | 376 [1] | 1.138 | 100 | 100.0 | 4 |

| Mov. | | | | | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Approach | 28 | 2157 | 856 | 3041 | 5.8 | 1.138 | | | |

| NorthWest: Pakuranga Road (West) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Mov. From NW To Exit: | L1 E | R2 SW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 313 | - | 313 | 5.6 | 708 | 0.442 | 100 | NA | NA |
| Lane 2 | 313 | - | 313 | 5.6 | 708 | 0.442 | 100 | NA | NA |
| Lane 3 | - | 288 | 288 | 9.4 | 346 | 0.832 | 100 | 53.0 | 2 |
| Approach | 625 | 288 | 913 | 6.8 | | 0.832 | | | |

| West: Pakuranga Road Busway Link (Northbound) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Mov. From W To Exit: | T1 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 9 | 9 | 100.0 | 454 | 0.020 | 100 | NA | NA |
| Approach | 9 | 9 | 100.0 | | 0.020 | | | |

| SouthWest: Flyover | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Mov. From SW To Exit: | L2 NW | R1 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 108 | - | 108 | 7.4 | 362 | 0.298 | 100 | 0.0 | 2 |
| Lane 2 | - | 388 | 388 | 4.9 | 644[1] | 0.603 | 100 | NA | NA |
| Lane 3 | - | 435 | 435 | 4.9 | 721 | 0.603 | 100 | NA | NA |
| Approach | 108 | 823 | 931 | 5.2 | | 0.603 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 4894 | 6.0 | 1.138 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

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

## Merge Analysis

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South Exit: Pakuranga Road Busway Link (Southbound) Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| East Exit: Pakuranga Road (East) Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | |
| NorthWest Exit: Pakuranga Road (West) Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | |
| SouthWest Exit: Flyover Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | |

Project:  C:\Users\jacques.vandenheever\Downloads\2028 Final AM.sip9

# LANE SUMMARY

## Site: 4.0 [4.0 Palm Ave / Aylesbury St (Site Folder: AM)]

Network: N101 [AM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated   Cycle Time = 144 seconds (Site User-Given Phase Times)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total | HV ] | ARRIVAL FLOWS [ Total | HV ] | Cap. | Deg. Satn | Lane Util. | Aver. Delay | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] | Lane Config | Lane Length | Cap. Adj. | Prob. Block. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | veh/h | % | veh/h | % | veh/h | v/c | % | sec | | | m | | m | % | % |
| **South: Ti Rakau Drive (East)** | | | | | | | | | | | | | | | |
| Lane 1 | 515 | 9.2 | 515 | 9.2 | 560 | 0.919 | 100 | 74.2 | LOS E | 21.3[N4] | 160.7[N4] | Full | 110 | 0.0 | 50.0 |
| Lane 2 | 565 | 9.3 | 565 | 9.3 | 615[1] | 0.919 | 100 | 65.4 | LOS E | 21.3[N4] | 160.7[N4] | Full | 110 | 0.0 | 50.0 |
| Lane 3 | 33 | 6.1 | 33 | 6.1 | 135 | 0.244 | 100 | 74.4 | LOS E | 2.0 | 14.9 | Short | 86 | 0.0 | NA |
| Lane 4 (B) | 53 | 100.0 | 53 | 100.0 | 506 | 0.105 | 100 | 3.9 | LOS A | 0.4 | 4.6 | Full | 110 | 0.0 | 0.0 |
| Approach | 1166 | 13.3 | 1166 | 13.3 | | 0.919 | | 66.8 | LOS E | 21.3 | 160.7 | | | | |
| **East: Aylesbury Street** | | | | | | | | | | | | | | | |
| Lane 1 | 76 | 9.2 | 76 | 9.2 | 115 | 0.658 | 100 | 76.5 | LOS E | 5.0 | 37.5 | Short | 30 | -10.5[N3] | NA |
| Lane 2 | 137 | 9.5 | 137 | 9.5 | 184[1] | 0.746 | 100 | 70.2 | LOS E | 7.7[N4] | 58.4[N4] | Full | 40 | 0.0 | 50.0 |
| Approach | 213 | 9.4 | 213 | 9.4 | | 0.746 | | 72.5 | LOS E | 7.7 | 58.4 | | | | |
| **North: Ti Rakau Drive (West)** | | | | | | | | | | | | | | | |
| Lane 1 (B) | 23 | 100.0 | 23 | 100.0 | 506 | 0.045 | 100 | 3.8 | LOS A | 0.1 | 1.9 | Full | 174 | 0.0 | 0.0 |
| Lane 2 | 148 | 17.6 | 146 | 17.7 | 205 | 0.712 | 100 | 73.3 | LOS E | 9.3 | 74.7 | Short | 100 | 0.0 | NA |
| Lane 3 | 290 | 16.5 | 286 | 16.7 | 544 | 0.526 | 100 | 40.3 | LOS D | 14.3 | 114.5 | Full | 174 | -10.5[N3] | 0.0 |
| Lane 4 | 278 | 16.5 | 274 | 16.7 | 522[1] | 0.526 | 100 | 39.9 | LOS D | 13.6 | 108.9 | Full | 174 | -10.5[N3] | 0.0 |
| Lane 5 | 15 | 0.0 | 15 | 0.0 | 141 | 0.105 | 100 | 72.9 | LOS E | 0.9 | 6.2 | Short | 14 | 0.0 | NA |
| Approach | 754 | 19.0 | 744[N1] | 19.1 | | 0.712 | | 46.1 | LOS D | 14.3 | 114.5 | | | | |
| **West: Palm Avenue** | | | | | | | | | | | | | | | |
| Lane 1 | 120 | 4.2 | 120 | 4.2 | 313 | 0.384 | 100 | 60.8 | LOS E | 6.7 | 48.6 | Full | 87 | -4.0[N7] | 0.0 |
| Approach | 120 | 4.2 | 120 | 4.2 | | 0.384 | | 60.8 | LOS E | 6.7 | 48.6 | | | | |
| Intersection | 2253 | 14.3 | 2243[N1] | 14.4 | | 0.919 | | 60.1 | LOS E | 21.3 | 160.7 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.
N3 Capacity Adjustment due to downstream lane blockage determined by the program.
N4 Average back of queue has been restricted to the available queue storage space.
N7 The capacity reduction has been determined from the queue blockage probability of a Site further downstream due to intermediate continuous lanes.

**Approach Lane Flows (veh/h)**

South: Ti Rakau Drive (East)

| Mov. From S To Exit: | L2 W | T1 N | R2 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 120 | 395 | - | 515 | 9.2 | 560 | 0.919 | 100 | NA | NA |
| Lane 2 | - | 565 | - | 565 | 9.3 | 615[1] | 0.919 | 100 | NA | NA |

| Mov. | L2 | T1 | R2 | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 3 | - | - | 33 | 33 | 6.1 | 135 | 0.244 | 100 | 0.0 | 2 |
| Lane 4 | - | 53 | - | 53 | 100.0 | 506 | 0.105 | 100 | NA | NA |
| Approach | 120 | 1013 | 33 | 1166 | 13.3 | | 0.919 | | | |
| East: Aylesbury Street | | | | | | | | | | |
| Mov. From E To Exit: | L2 S | T1 W | R2 N | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 76 | - | - | 76 | 9.2 | 115 | 0.658 | 100 | 35.5 | 2 |
| Lane 2 | - | 10 | 127 | 137 | 9.5 | 184 [1] | 0.746 | 100 | NA | NA |
| Approach | 76 | 10 | 127 | 213 | 9.4 | | 0.746 | | | |
| North: Ti Rakau Drive (West) | | | | | | | | | | |
| Mov. From N To Exit: | L2 E | T1 S | R2 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | - | 23 | - | 23 | 100.0 | 506 | 0.045 | 100 | NA | NA |
| Lane 2 | 146 | - | - | 146 | 17.7 | 205 | 0.712 | 100 | 0.0 | 3 |
| Lane 3 | - | 286 | - | 286 | 16.7 | 544 | 0.526 | 100 | NA | NA |
| Lane 4 | - | 274 | - | 274 | 16.7 | 522 [1] | 0.526 | 100 | NA | NA |
| Lane 5 | - | - | 15 | 15 | 0.0 | 141 | 0.105 | 100 | 0.0 | 4 |
| Approach | 146 | 583 | 15 | 744 | 19.1 | | 0.712 | | | |
| West: Palm Avenue | | | | | | | | | | |
| Mov. From W To Exit: | L2 N | T1 E | R2 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 51 | 27 | 42 | 120 | 4.2 | 313 | 0.384 | 100 | NA | NA |
| Approach | 51 | 27 | 42 | 120 | 4.2 | | 0.384 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 2243 | 14.4 | 0.919 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

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

## Merge Analysis

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South Exit: Ti Rakau Drive (East) Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | |
| East Exit: Aylesbury Street Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| North Exit: Ti Rakau Drive (West) Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | |
| West Exit: Palm Avenue Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |

# LANE SUMMARY

## Site: 5.0 [5.0 Pakuranga Highway / Reeves Rd (Site Folder: AM)]

## Network: N101 [AM (Network Folder: General)]

Site Category: (None)
Single Point Interchange (Signals) - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 146 seconds (Site User-Given Phase Times)

### Lane Use and Performance

| | DEMAND FLOWS [ Total | HV ] | ARRIVAL FLOWS [ Total | HV ] | Cap. | Deg. Satn | Lane Util. | Aver. Delay | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] | Lane Config | Lane Length | Cap. Adj. | Prob. Block. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | veh/h | % | veh/h | % | veh/h | v/c | % | sec | | | m | | m | % | % |
| **SouthEast: Ti Rakau Drive (East)** | | | | | | | | | | | | | | | |
| Lane 1 | 404 | 12.8 | 404 | 12.8 | 1229 | 0.328 | 100 | 12.3 | LOS B | 9.0 | 70.1 | Short | 50 | 0.0 | NA |
| Lane 2 | 404 | 12.8 | 404 | 12.8 | 1229 | 0.328 | 100 | 12.3 | LOS B | 9.0 | 70.1 | Full | 90 | 0.0 | 0.0 |
| Lane 3 | 474 | 9.1 | 474 | 9.1 | 464 | 1.020 | 100 | 121.3 | LOS F | 17.4[N4] | 131.5[N4] | Full | 90 | -50.0[N3] | 50.0 |
| Lane 4 | 474 | 9.1 | 474 | 9.1 | 464 | 1.020 | 100 | 121.3 | LOS F | 17.4[N6] | 131.5[N6] | Full | 90 | -50.0[N3] | 50.0 |
| Lane 5 (B) | 25 | 100.0 | 25 | 100.0 | 155 | 0.161 | 100 | 32.9 | LOS C | 0.8 | 10.1 | Full | 90 | 0.0 | 0.0 |
| Approach | 1779 | 12.0 | 1779 | 12.0 | | 1.020 | | 70.6 | LOS E | 17.4 | 131.5 | | | | |
| **NorthEast: Reeves Road** | | | | | | | | | | | | | | | |
| Lane 1 (B) | 28 | 100.0 | 28 | 100.0 | 368 | 0.076 | 100 | 23.3 | LOS C | 0.8 | 10.0 | Full | 50 | 0.0 | 0.0 |
| Approach | 28 | 100.0 | 28 | 100.0 | | 0.076 | | 23.3 | LOS C | 0.8 | 10.0 | | | | |
| **NorthWest: Ti Rakau Drive (West)** | | | | | | | | | | | | | | | |
| Lane 1 (B) | 22 | 100.0 | 22 | 100.0 | 184 | 0.120 | 100 | 31.8 | LOS C | 0.6 | 8.4 | Full | 110 | 0.0 | 0.0 |
| Lane 2 | 271 | 17.2 | 268 | 17.3 | 609 | 0.440 | 100 | 39.0 | LOS D | 13.0 | 104.7 | Full | 110 | 0.0 | 10.5 |
| Lane 3 | 271 | 17.2 | 268 | 17.3 | 609 | 0.440 | 100 | 39.0 | LOS D | 13.0 | 104.7 | Full | 110 | 0.0 | 10.5 |
| Lane 4 | 100 | 7.0 | 99 | 7.1 | 217 | 0.456 | 100 | 70.2 | LOS E | 6.0 | 44.5 | Short | 71 | 0.0 | NA |
| Approach | 664 | 18.4 | 657[N1] | 18.5 | | 0.456 | | 43.4 | LOS D | 13.0 | 104.7 | | | | |
| **SouthWest: Pakuranga Highway** | | | | | | | | | | | | | | | |
| Lane 1 | 132 | 10.6 | 132 | 10.6 | 263 | 0.502 | 100 | 41.8 | LOS D | 6.1 | 46.4 | Short | 72 | -50.0[N3] | NA |
| Lane 2 | 248 | 12.3 | 248 | 12.3 | 294[1] | 0.844 | 100 | 78.0 | LOS E | 16.7 | 129.1 | Short | 143 | 0.0 | NA |
| Lane 3 | 259 | 12.3 | 259 | 12.3 | 307 | 0.844 | 100 | 78.2 | LOS E | 17.5 | 135.7 | Short | 240 | 0.0 | NA |
| Lane 4 | 259 | 12.3 | 259 | 12.3 | 307 | 0.844 | 100 | 78.2 | LOS E | 17.5 | 135.7 | Full | 623 | 0.0 | 0.0 |
| Approach | 899 | 12.0 | 899 | 12.0 | | 0.844 | | 72.8 | LOS E | 17.5 | 135.7 | | | | |
| Intersection | 3370 | 14.0 | 3363[N1] | 14.0 | | 1.020 | | 65.5 | LOS E | 17.5 | 135.7 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.
N3 Capacity Adjustment due to downstream lane blockage determined by the program.
N4 Average back of queue has been restricted to the available queue storage space.
N6 Continuous Lane results determined by Back of Queue values of downstream lanes (proportional to lane movement flows) but average back of queue has been restricted to the available queue storage space.

### Approach Lane Flows (veh/h)

SouthEast: Ti Rakau Drive (East)

| Mov. From SE | L2 | T1 | Total | %HV | Cap. | Deg. Satn | Lane Util. | Prob. SL Ov. | Ov. Lane |
|---|---|---|---|---|---|---|---|---|---|

| To Exit: | SW | NW | Total | %HV | veh/h | v/c | % | % | No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 404 | - | 404 | 12.8 | 1229 | 0.328 | 100 | 46.1 | 2 |
| Lane 2 | 404 | - | 404 | 12.8 | 1229 | 0.328 | 100 | NA | NA |
| Lane 3 | - | 474 | 474 | 9.1 | 464 | 1.020 | 100 | NA | NA |
| Lane 4 | - | 474 | 474 | 9.1 | 464 | 1.020 | 100 | NA | NA |
| Lane 5 | - | 25 | 25 | 100.0 | 155 | 0.161 | 100 | NA | NA |
| Approach | 807 | 972 | 1779 | 12.0 | | 1.020 | | | |

NorthEast: Reeves Road

| Mov. From NE To Exit: | R2 NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|
| Lane 1 | 28 | 28 | 100.0 | 368 | 0.076 | 100 | NA | NA |
| Approach | 28 | 28 | 100.0 | | 0.076 | | | |

NorthWest: Ti Rakau Drive (West)

| Mov. From NW To Exit: | L2 NE | T1 SE | R2 SW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 9 | 13 | - | 22 | 100.0 | 184 | 0.120 | 100 | NA | NA |
| Lane 2 | - | 268 | - | 268 | 17.3 | 609 | 0.440 | 100 | NA | NA |
| Lane 3 | - | 268 | - | 268 | 17.3 | 609 | 0.440 | 100 | NA | NA |
| Lane 4 | - | - | 99 | 99 | 7.1 | 217 | 0.456 | 100 | 0.0 | 3 |
| Approach | 9 | 549 | 99 | 657 | 18.5 | | 0.456 | | | |

SouthWest: Pakuranga Highway

| Mov. From SW To Exit: | L2 NW | R2 SE | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 132 | - | 132 | 10.6 | 263 | 0.502 | 100 | 0.0 | 2 |
| Lane 2 | - | 248 | 248 | 12.3 | 294[1] | 0.844 | 100 | 5.7 | 3 |
| Lane 3 | - | 259 | 259 | 12.3 | 307 | 0.844 | 100 | 0.0 | 4 |
| Lane 4 | - | 259 | 259 | 12.3 | 307 | 0.844 | 100 | NA | NA |
| Approach | 132 | 767 | 899 | 12.0 | | 0.844 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 3363 | 14.0 | 1.020 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

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

**Merge Analysis**

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast Exit: Ti Rakau Drive (East)<br>Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 4 | Merge Analysis not applied. | | | | | | | | | |
| NorthEast Exit: Reeves Road<br>Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| NorthWest Exit: Ti Rakau Drive (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | | |
| SouthWest Exit: Pakuranga Highway<br>Merge Type: **Zipper** | | | | | | | | | | | | |
| Exit Short Lane | 1 | 280 | 50.0 | 251 | 266 | 2.50 | 2.00 | 404 | 1477 | 0.273 | 0.0 | 0.2 |
| Merge Lane | 2 | - | 50.0 | 202 | 215 | 2.50 | 2.00 | 502 | 1545 | 0.325 | 0.0 | 0.1 |
| SouthWest Exit: Pakuranga Highway<br>Merge Type: **Zipper** | | | | | | | | | | | | |
| Exit Short Lane | 3 | 10 | 50.0 | 202 | 215 | 2.50 | 2.00 | 99 | 1545 | 0.064 | 0.0 | 0.1 |
| Merge Lane | 2 | - | 50.0 | 49 | 51 | 2.50 | 2.00 | 404 | 1743 | 0.232 | 0.0 | 0.0 |

# CCG LANE SUMMARY

## Common Control Group: CCG3 [Aylesbury/ WR/ Reeves Rd]

**Network: N101 [AM (Network Folder: General)]**

EQUISAT (Fixed-Time/SCATS) Isolated    Cycle Time = 112 seconds (CCG User-Given Phase Times)

**Lane Use and Performance (CCG)**

| | DEMAND FLOWS [ Total | HV ] | ARRIVAL FLOWS [ Total | HV ] | Cap. | Deg. Satn | Lane Util. | Aver. Delay | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] | Lane Config | Lane Length | Cap. Adj. | Prob. Block. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | veh/h | % | veh/h | % | veh/h | v/c | % | sec | | | m | | m | % | % |
| **Site: 5.2v [5.2 Aylesbury St/ Reeves Rd/ Busway Link signalised]** | | | | | | | | | | | | | | | |
| SouthEast: Reeves Road (East) | | | | | | | | | | | | | | | |
| Lane 1 | 136 | 8.1 | 136 | 8.1 | 330 | 0.412 | 100 | 14.9 | LOS B | 2.4 | 18.0 | Full | 27 | -8.6[N7] | 0.0 |
| Approach | 136 | 8.1 | 136 | 8.1 | | 0.412 | | 14.9 | LOS B | 2.4 | 18.0 | | | | |
| East: Pakuranga Rd Busway Link (Southbound) | | | | | | | | | | | | | | | |
| Lane 1 (B) | 28 | 100.0 | 28 | 100.0 | 142 | 0.197 | 100 | 54.1 | LOS D | 1.3 | 16.8 | Full | 203 | 0.0 | 0.0 |
| Approach | 28 | 100.0 | 28 | 100.0 | | 0.197 | | 54.1 | LOS D | 1.3 | 16.8 | | | | |
| NorthWest: Aylesbury Street | | | | | | | | | | | | | | | |
| Lane 1 | 21 | 0.0 | 21 | 0.0 | 141 | 0.149 | 100 | 51.4 | LOS D | 1.0 | 6.8 | Full | 284 | -31.1[N7] | 0.0 |
| Approach | 21 | 0.0 | 21 | 0.0 | | 0.149 | | 51.4 | LOS D | 1.0 | 6.8 | | | | |
| SouthWest: Reeves Road (South) | | | | | | | | | | | | | | | |
| Lane 1 | 116 | 22.5 | 115 | 22.6 | 193 | 0.596 | 100 | 48.0 | LOS D | 5.4 | 45.1 | Full | 180 | -42.6[N7] | 0.0 |
| Approach | 116 | 22.5 | 115[N1] | 22.6 | | 0.596 | | 48.0 | LOS D | 5.4 | 45.1 | | | | |
| Intersection | 301 | 21.6 | 300[N1] | 21.7 | | 0.596 | | 33.8 | LOS C | 5.4 | 45.1 | | | | |
| **Site: 7.3v [7.3 William Roberts Rd / Reeves Rd signalised]** | | | | | | | | | | | | | | | |
| SouthEast: Reeves Rd (East) | | | | | | | | | | | | | | | |
| Lane 1 | 303 | 8.3 | 303 | 8.3 | 321[1] | 0.943 | 100 | 76.2 | LOS E | 18.7 | 140.1 | Full | 810 | 0.0 | 0.0 |
| Lane 2 | 108 | 7.4 | 108 | 7.4 | 376 | 0.287 | 100 | 43.4 | LOS D | 4.5 | 33.6 | Short | 45 | 0.0 | NA |
| Approach | 411 | 8.0 | 411 | 8.0 | | 0.943 | | 67.6 | LOS E | 18.7 | 140.1 | | | | |
| NorthWest: Reeves Rd (West) | | | | | | | | | | | | | | | |
| Lane 1 | 107 | 15.0 | 107 | 15.0 | 464 | 0.230 | 100 | 43.1 | LOS D | 4.8 | 37.9 | Full | 27 | 0.0 | 46.2 |
| Approach | 107 | 15.0 | 107 | 15.0 | | 0.230 | | 43.1 | LOS D | 4.8 | 37.9 | | | | |
| SouthWest: William Roberts Road (South) | | | | | | | | | | | | | | | |
| Lane 1 | 333 | 12.3 | 332 | 12.3 | 351 | 0.947 | 100 | 75.2 | LOS E | 21.0 | 162.3 | Full | 223 | 0.0 | 0.0 |
| Approach | 333 | 12.3 | 332[N1] | 12.3 | | 0.947 | | 75.2 | LOS E | 21.0 | 162.3 | | | | |
| Intersection | 851 | 10.6 | 849[N1] | 10.6 | | 0.947 | | 67.5 | LOS E | 21.0 | 162.3 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.
N7 The capacity reduction has been determined from the queue blockage probability of a Site further downstream due to intermediate continuous lanes.

## Approach Lane Flows (CCG) (veh/h)

Site: 5.2v [5.2 Aylesbury St/ Reeves Rd/ Busway Link signalised]

SouthEast: Reeves Road (East)

| Mov. From SE To Exit: | L2 SW | T1 NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 101 | 35 | 136 | 8.1 | 330 | 0.412 | 100 | NA | NA |
| Approach | 101 | 35 | 136 | 8.1 | | 0.412 | | | |

East: Pakuranga Rd Busway Link (Southbound)

| Mov. From E To Exit: | L1 SW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|
| Lane 1 | 28 | 28 | 100.0 | 142 | 0.197 | 100 | NA | NA |
| Approach | 28 | 28 | 100.0 | | 0.197 | | | |

NorthWest: Aylesbury Street

| Mov. From NW To Exit: | T1 SE | R2 SW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 11 | 10 | 21 | 0.0 | 141 | 0.149 | 100 | NA | NA |
| Approach | 11 | 10 | 21 | 0.0 | | 0.149 | | | |

SouthWest: Reeves Road (South)

| Mov. From SW To Exit: | L2 NW | T1 NE | R2 SE | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 12 | 9 | 95 | 115 | 22.6 | 193 | 0.596 | 100 | NA | NA |
| Approach | 12 | 9 | 95 | 115 | 22.6 | | 0.596 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 300 | 21.7 | 0.596 |

Site: 7.3v [7.3 William Roberts Rd / Reeves Rd signalised]

SouthEast: Reeves Rd (East)

| Mov. From SE To Exit: | L2 SW | T1 NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 303 | - | 303 | 8.3 | 321 [1] | 0.943 | 100 | NA | NA |
| Lane 2 | - | 108 | 108 | 7.4 | 376 | 0.287 | 100 | 0.0 | 1 |
| Approach | 303 | 108 | 411 | 8.0 | | 0.943 | | | |

NorthWest: Reeves Rd (West)

| Mov. From NW To Exit: | T1 SE | R2 SW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 85 | 22 | 107 | 15.0 | 464 | 0.230 | 100 | NA | NA |
| Approach | 85 | 22 | 107 | 15.0 | | 0.230 | | | |

SouthWest: William Roberts Road (South)

| Mov. From SW To Exit: | L2 NW | R2 SE | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 25 | 307 | 332 | 12.3 | | 351 | 0.947 | 100 | NA | NA |
| Approach | 25 | 307 | 332 | 12.3 | | | 0.947 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 849 | 10.6 | 0.947 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

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

| Merge Analysis (CCG) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
| Site: 5.2v [5.2 Aylesbury St/ Reeves Rd/ Busway Link signalised] | | | | | | | | | | | | |
| SouthEast Exit: Reeves Road (East)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| NorthEast Exit: Pakuranga Rd Busway Link (Northbound)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| NorthWest Exit: Aylesbury Street<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| SouthWest Exit: Reeves Road (South)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Site: 7.3v [7.3 William Roberts Rd / Reeves Rd signalised] | | | | | | | | | | | | |
| SouthEast Exit: Reeves Rd (East)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| NorthWest Exit: Reeves Rd (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| SouthWest Exit: William Roberts Road (South)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |

# CCG LANE SUMMARY

## Common Control Group: CCG2 [WRR / Mattson]

**Network: N101 [AM (Network Folder: General)]**

EQUISAT (Fixed-Time/SCATS) Isolated    Cycle Time = 110 seconds (CCG User-Given Phase Times)

| Lane Use and Performance (CCG) | DEMAND FLOWS [ Total | HV ] | ARRIVAL FLOWS [ Total | HV ] | Cap. | Deg. Satn | Lane Util. | Aver. Delay | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] | Lane Config | Lane Length | Cap. Adj. | Prob. Block. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | veh/h | % | veh/h | % | veh/h | v/c | % | sec | | | m | | m | % | % |
| **Site: 7.0 [7.0 William Roberts Rd / Ti Rakau Dr]** | | | | | | | | | | | | | | | |
| **SouthEast: Ti Rakau Drive (East)** | | | | | | | | | | | | | | | |
| Lane 1 | 535 | 11.2 | 535 | 11.2 | 953 | 0.561 | 100 | 5.7 | LOS A | 7.1 | 54.7 | Full | 60 | 0.0 | 6.7 |
| Lane 2 | 535 | 11.2 | 535 | 11.2 | 953 | 0.561 | 100 | 1.1 | LOS A | 1.6 | 12.3 | Full | 60 | 0.0 | 0.0 |
| Lane 3 | 442 | 11.2 | 442 | 11.2 | 788 | 0.561 | 100 | 1.1 | LOS A | 1.3 | 10.1 | Full | 60 | -17.4[N7] | 0.0 |
| Lane 4 | 96 | 8.3 | 96 | 8.3 | 123[1] | 0.778 | 100 | 58.9 | LOS E | 4.8 | 36.3 | Short | 20 | 0.0 | NA |
| Lane 5 (B) | 25 | 100.0 | 25 | 100.0 | 630 | 0.040 | 100 | 0.6 | LOS A | 0.0 | 0.3 | Full | 60 | 0.0 | 0.0 |
| Approach | 1633 | 12.4 | 1633 | 12.4 | | 0.778 | | 6.0 | LOS A | 7.1 | 54.7 | | | | |
| **NorthEast: William Roberts Road Extension** | | | | | | | | | | | | | | | |
| Lane 1 | 165 | 10.3 | 165 | 10.3 | 313 | 0.527 | 100 | 46.9 | LOS D | 7.3 | 56.0 | Short | 80 | 0.0 | NA |
| Lane 2 | 167 | 8.4 | 167 | 8.4 | 183 | 0.910 | 100 | 70.4 | LOS E | 9.7 | 73.0 | Full | 110 | -17.4[N7] | 0.0 |
| Approach | 332 | 9.3 | 332 | 9.3 | | 0.910 | | 58.7 | LOS E | 9.7 | 73.0 | | | | |
| **NorthWest: Ti Rakau Drive (West)** | | | | | | | | | | | | | | | |
| Lane 1 | 359 | 11.6 | 358 | 11.6 | 706 | 0.507 | 100 | 23.6 | LOS C | 10.9 | 83.8 | Full | 107 | 0.0 | 0.0 |
| Lane 2 | 474 | 15.2 | 472 | 15.3 | 930 | 0.507 | 100 | 17.9 | LOS B | 14.5 | 114.6 | Full | 107 | 0.0 | 21.3 |
| Lane 3 | 474 | 15.2 | 472 | 15.3 | 930 | 0.507 | 100 | 17.9 | LOS B | 14.5 | 114.6 | Full | 107 | 0.0 | 21.3 |
| Lane 4 (B) | 13 | 100.0 | 13 | 100.0 | 630 | 0.021 | 100 | 0.6 | LOS A | 0.0 | 0.2 | Full | 107 | 0.0 | 0.0 |
| Approach | 1320 | 15.1 | 1314[N1] | 15.1 | | 0.507 | | 19.3 | LOS B | 14.5 | 114.6 | | | | |
| Intersection | 3285 | 13.2 | 3279[N1] | 13.2 | | 0.910 | | 16.7 | LOS B | 14.5 | 114.6 | | | | |
| **Site: 7.5 [7.5 Mattson Rd/ Ti Rakau Dr]** | | | | | | | | | | | | | | | |
| **SouthEast: Ti Rakau Drive (East)** | | | | | | | | | | | | | | | |
| Lane 1 | 256 | 10.4 | 256 | 10.4 | 285 | 0.898 | 100 | 73.0 | LOS E | 15.3 | 116.8 | Short | 25 | -46.3[N3] | NA |
| Lane 2 | 472 | 11.1 | 472 | 11.1 | 525[1] | 0.898 | 100 | 40.5 | LOS D | 21.2 | 162.6 | Full | 143 | -1.5[N7] | 26.7 |
| Lane 3 | 857 | 11.1 | 857 | 11.1 | 954 | 0.898 | 100 | 37.0 | LOS D | 27.3[N4] | 209.0[N4] | Full | 143 | 0.0 | 50.0 |
| Lane 4 (B) | 25 | 100.0 | 25 | 100.0 | 620 | 0.040 | 100 | 13.3 | LOS B | 0.6 | 7.4 | Full | 143 | 0.0 | 0.0 |
| Approach | 1609 | 12.4 | 1609 | 12.4 | | 0.898 | | 43.4 | LOS D | 27.3 | 209.0 | | | | |
| **NorthWest: Ti Rakau Drive (West)** | | | | | | | | | | | | | | | |
| Lane 1 | 131 | 14.4 | 131 | 14.5 | 935 | 0.140 | 27[6] | 28.8 | LOS C | 5.8 | 45.7 | Full | 60 | 0.0 | 0.0 |
| Lane 2 | 482 | 14.4 | 480 | 14.5 | 935 | 0.513 | 100 | 4.4 | LOS A | 4.8 | 38.0 | Full | 60 | 0.0 | 0.0 |
| Lane 3 | 482 | 14.4 | 480 | 14.5 | 935 | 0.513 | 100 | 1.0 | LOS A | 1.2 | 9.8 | Full | 60 | 0.0 | 0.0 |
| Lane 4 | 26 | 15.4 | 26 | 15.4 | 303 | 0.086 | 100 | 52.9 | LOS D | 1.2 | 9.8 | Short | 25 | 0.0 | NA |
| Lane 5 (B) | 13 | 100.0 | 13 | 100.0 | 620 | 0.021 | 100 | 1.5 | LOS A | 0.0 | 0.4 | Full | 60 | 0.0 | 0.0 |
| Approach | 1134 | 15.4 | 1130[N1] | 15.5 | | 0.513 | | 6.9 | LOS A | 5.8 | 45.7 | | | | |
| **SouthWest: Mattson Road** | | | | | | | | | | | | | | | |
| Lane 1 | 54 | 7.4 | 54 | 7.4 | 160 | 0.338 | 100 | 49.2 | LOS D | 2.4 | 17.8 | Full | 282 | -50.0[N3] | 0.0 |
| Lane 2 | 25 | 12.0 | 25 | 12.0 | 217 | 0.115 | 100 | 51.5 | LOS D | 1.1 | 8.4 | Full | 282 | 0.0 | 0.0 |
| Approach | 79 | 8.9 | 79 | 8.9 | | 0.338 | | 50.0 | LOS D | 2.4 | 17.8 | | | | |
| Intersection | 2822 | 13.5 | 2818[N1] | 13.5 | | 0.898 | | 28.9 | LOS C | 27.3 | 209.0 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
6 Lane under-utilisation due to downstream effects
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.
N3 Capacity Adjustment due to downstream lane blockage determined by the program.
N4 Average back of queue has been restricted to the available queue storage space.
N7 The capacity reduction has been determined from the queue blockage probability of a Site further downstream due to intermediate continuous lanes.

## Approach Lane Flows (CCG) (veh/h)

Site: 7.0 [7.0 William Roberts Rd / Ti Rakau Dr]

SouthEast: Ti Rakau Drive (East)

| Mov. From SE To Exit: | T1 NW | R2 NE | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 535 | - | 535 | 11.2 | 953 | 0.561 | 100 | NA | NA |
| Lane 2 | 535 | - | 535 | 11.2 | 953 | 0.561 | 100 | NA | NA |
| Lane 3 | 442 | - | 442 | 11.2 | 788 | 0.561 | 100 | NA | NA |
| Lane 4 | - | 96 | 96 | 8.3 | 123 [1] | 0.778 | 100 | 70.7 | 3 |
| Lane 5 | 25 | - | 25 | 100.0 | 630 | 0.040 | 100 | NA | NA |
| Approach | 1537 | 96 | 1633 | 12.4 | | 0.778 | | | |

NorthEast: William Roberts Road Extension

| Mov. From NE To Exit: | L2 SE | R2 NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 165 | - | 165 | 10.3 | 313 | 0.527 | 100 | 0.0 | 2 |
| Lane 2 | - | 167 | 167 | 8.4 | 183 | 0.910 | 100 | NA | NA |
| Approach | 165 | 167 | 332 | 9.3 | | 0.910 | | | |

NorthWest: Ti Rakau Drive (West)

| Mov. From NW To Exit: | L2 NE | T1 SE | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 347 | 10 | 358 | 11.6 | 706 | 0.507 | 100 | NA | NA |
| Lane 2 | - | 472 | 472 | 15.3 | 930 | 0.507 | 100 | NA | NA |
| Lane 3 | - | 472 | 472 | 15.3 | 930 | 0.507 | 100 | NA | NA |
| Lane 4 | - | 13 | 13 | 100.0 | 630 | 0.021 | 100 | NA | NA |
| Approach | 347 | 967 | 1314 | 15.1 | | 0.507 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 3279 | 13.2 | 0.910 |

Site: 7.5 [7.5 Mattson Rd/ Ti Rakau Dr]

SouthEast: Ti Rakau Drive (East)

| Mov. From SE To Exit: | L2 SW | T1 NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 35 | 221 | 256 | 10.4 | 285 | 0.898 | 100 | 100.0 | 2 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Lane 2 | - | 472 | 472 | 11.1 | 525[1] | 0.898 | 100 | NA | NA |
| Lane 3 | - | 857 | 857 | 11.1 | 954 | 0.898 | 100 | NA | NA |
| Lane 4 | - | 25 | 25 | 100.0 | 620 | 0.040 | 100 | NA | NA |
| Approach | 35 | 1574 | 1609 | 12.4 | | 0.898 | | | |

NorthWest: Ti Rakau Drive (West)

| Mov. From NW To Exit: | T1 SE | R2 SW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 131 | - | 131 | 14.5 | 935 | 0.140 | 27[6] | NA | NA |
| Lane 2 | 480 | - | 480 | 14.5 | 935 | 0.513 | 100 | NA | NA |
| Lane 3 | 480 | - | 480 | 14.5 | 935 | 0.513 | 100 | NA | NA |
| Lane 4 | - | 26 | 26 | 15.4 | 303 | 0.086 | 100 | 0.0 | 3 |
| Lane 5 | 13 | - | 13 | 100.0 | 620 | 0.021 | 100 | NA | NA |
| Approach | 1104 | 26 | 1130 | 15.5 | | 0.513 | | | |

SouthWest: Mattson Road

| Mov. From SW To Exit: | L2 NW | R2 SE | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 54 | - | 54 | 7.4 | 160 | 0.338 | 100 | NA | NA |
| Lane 2 | - | 25 | 25 | 12.0 | 217 | 0.115 | 100 | NA | NA |
| Approach | 54 | 25 | 79 | 8.9 | | 0.338 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 2818 | 13.5 | 0.898 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

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

6 Lane under-utilisation due to downstream effects

## Merge Analysis (CCG)

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Site: 7.0 [7.0 William Roberts Rd / Ti Rakau Dr] | | | | | | | | | | | |
| SouthEast Exit: Ti Rakau Drive (East) Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 4 | Merge Analysis not applied. | | | | | | | | | |
| NorthEast Exit: William Roberts Road Extension Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| NorthWest Exit: Ti Rakau Drive (West) Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 4 | Merge Analysis not applied. | | | | | | | | | |

| Site: 7.5 [7.5 Mattson Rd/ Ti Rakau Dr] | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast Exit: Ti Rakau Drive (East)<br>Merge Type: **Priority** | | | | | | | | | | | | | |
| Exit Short Lane | 1 | 40 | 0.0 | 480 | 515 | 3.00 | 2.00 | 131 | 1271 | 0.103 | 0.9 | 1.1 |
| Merge Lane | 2 | - | 100.0 | Merge Lane is not Opposed | | | | 480 | 1800 | 0.267 | 0.0 | 0.0 |
| NorthWest Exit: Ti Rakau Drive (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | | | |
| Full Length Lane | 4 | Merge Analysis not applied. | | | | | | | | | | | |
| SouthWest Exit: Mattson Road<br>Merge Type: **Not Applied** | | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | | |

# LANE SUMMARY

## Site: 7.1 [7.1 William Roberts Rd / Cortina Pl (Site Folder: AM)]

## Network: N101 [AM (Network Folder: General)]

Site Category: (None)
Give-Way (Two-Way)

### Lane Use and Performance

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NorthEast: William Roberts Road (North) | | | | | | | | | | | | | | | |
| Lane 1 | 368 | 8.7 | 368 | 8.7 | 1593 | 0.231 | 100 | 1.9 | LOS A | 0.7 | 5.1 | Full | 223 | 0.0 | 0.0 |
| Approach | 368 | 8.7 | 368 | 8.7 | | 0.231 | | 1.9 | NA | 0.7 | 5.1 | | | | |
| NorthWest: Cortina Place | | | | | | | | | | | | | | | |
| Lane 1 | 92 | 13.0 | 92 | 13.1 | 740 | 0.124 | 100 | 5.3 | LOS A | 0.3 | 2.7 | Full | 177 | 0.0 | 0.0 |
| Approach | 92 | 13.0 | 92 | 13.1 | | 0.124 | | 5.3 | LOS A | 0.3 | 2.7 | | | | |
| SouthWest: William Roberts Road (South) | | | | | | | | | | | | | | | |
| Lane 1 | 447 | 11.0 | 445 | 11.0 | 1740 | 0.256 | 100 | 0.7 | LOS A | 0.0 | 0.0 | Full | 110 | 0.0 | 0.0 |
| Approach | 447 | 11.0 | 445[N1] | 11.0 | | 0.256 | | 0.7 | NA | 0.0 | 0.0 | | | | |
| Intersection | 907 | 10.3 | 905[N1] | 10.3 | | 0.256 | | 1.7 | NA | 0.7 | 5.1 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

### Approach Lane Flows (veh/h)

NorthEast: William Roberts Road (North)

| Mov. From NE To Exit: | T1 SW | R2 NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 284 | 84 | 368 | 8.7 | 1593 | 0.231 | 100 | NA | NA |
| Approach | 284 | 84 | 368 | 8.7 | | 0.231 | | | |

NorthWest: Cortina Place

| Mov. From NW To Exit: | L2 NE | R2 SW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 29 | 63 | 92 | 13.1 | 740 | 0.124 | 100 | NA | NA |
| Approach | 29 | 63 | 92 | 13.1 | | 0.124 | | | |

SouthWest: William Roberts Road (South)

| Mov. From SW To Exit: | L2 NW | T1 NE | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 149 | 296 | 445 | 11.0 | 1740 | 0.256 | 100 | NA | NA |
| Approach | 149 | 296 | 445 | 11.0 | | 0.256 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|

| | | | |
|---|---|---|---|
| Intersection | 905 | 10.3 | 0.256 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

**Merge Analysis**

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | Opposing Flow Rate pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NorthEast Exit: William Roberts Road (North)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| NorthWest Exit: Cortina Place<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| SouthWest Exit: William Roberts Road (South)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |

# LANE SUMMARY

**Site: 13.0 [13.0 Gossamer Dr / Ti Rakau Dr (Site Folder: PM)]**

**Network: N101 [PM (Network Folder: General)]**

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated    Cycle Time = 150 seconds (Site User-Given Phase Times)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Fremantle Place | | | | | | | | | | | | | | | |
| Lane 1 | 12 | 8.3 | 12 | 8.3 | 82 | 0.146 | 100 | 82.3 | LOS F | 0.8 | 5.9 | Short | 9 | 0.0 | NA |
| Lane 2 | 27 | 7.4 | 27 | 7.4 | 84 | 0.321 | 100 | 81.8 | LOS F | 1.8 | 13.5 | Full | 285 | 0.0 | 0.0 |
| Approach | 39 | 7.7 | 39 | 7.7 | | 0.321 | | 82.0 | LOS F | 1.8 | 13.5 | | | | |
| East: Ti Rakau Drive (East) | | | | | | | | | | | | | | | |
| Lane 1 | 788 | 7.7 | 788 | 7.7 | 884 | 0.891 | 100 | 46.1 | LOS D | 51.1 | 381.5 | Full | 636 | 0.0 | 0.0 |
| Lane 2 | 756 | 7.7 | 756 | 7.7 | 848 [1] | 0.891 | 100 | 45.6 | LOS D | 48.1 | 359.2 | Full | 636 | 0.0 | 0.0 |
| Lane 3 (B) | 28 | 100.0 | 28 | 100.0 | 235 | 0.119 | 100 | 35.0 | LOS D | 1.2 | 15.5 | Short | 60 | 0.0 | NA |
| Lane 4 | 259 | 5.6 | 259 | 5.6 | 261 | 0.994 | 82 [6] | 118.0 | LOS F | 22.8 | 167.3 | Short | 150 | 0.0 | NA |
| Lane 5 | 316 | 5.6 | 316 | 5.6 | 261 | 1.212 | 100 | 273.5 | LOS F | 44.3 | 324.5 | Short | 103 | 0.0 | NA |
| Approach | 2147 | 8.3 | 2147 | 8.3 | | 1.212 | | 87.9 | LOS F | 51.1 | 381.5 | | | | |
| North: Gossamer Drive | | | | | | | | | | | | | | | |
| Lane 1 | 167 | 8.7 | 167 | 8.7 | 321 | 0.518 | 100 | 56.1 | LOS E | 8.2 | 61.6 | Short | 150 | 0.0 | NA |
| Lane 2 | 168 | 8.7 | 168 | 8.7 | 325 | 0.518 | 100 | 56.1 | LOS E | 8.3 | 62.2 | Full | 1010 | 0.0 | 0.0 |
| Lane 3 | 59 | 5.1 | 59 | 5.1 | 72 | 0.821 | 100 | 90.6 | LOS F | 4.3 | 31.2 | Short | 28 | 0.0 | NA |
| Approach | 394 | 8.1 | 394 | 8.1 | | 0.821 | | 61.3 | LOS E | 8.3 | 62.2 | | | | |
| West: Ti Rakau Drive (West) | | | | | | | | | | | | | | | |
| Lane 1 | 116 | 1.7 | 116 | 1.7 | 815 | 0.142 | 100 | 30.4 | LOS C | 4.4 | 31.2 | Short | 28 | 0.0 | NA |
| Lane 2 | 597 | 8.6 | 597 | 8.6 | 537 [1] | 1.112 | 100 | 183.5 | LOS F | 71.8 | 539.8 | Full | 479 | 0.0 | 25.9 |
| Lane 3 | 630 | 8.6 | 630 | 8.6 | 566 [1] | 1.112 | 100 | 182.5 | LOS F | 75.5 | 567.6 | Full | 479 | 0.0 | 30.5 |
| Lane 4 | 58 | 1.7 | 58 | 1.7 | 210 | 0.276 | 100 | 68.3 | LOS E | 3.4 | 24.5 | Short | 23 | 0.0 | NA |
| Lane 5 (B) | 27 | 100.0 | 27 | 100.0 | 239 | 0.113 | 100 | 34.9 | LOS C | 1.1 | 14.9 | Full | 479 | 0.0 | 0.0 |
| Approach | 1428 | 9.5 | 1428 | 9.5 | | 1.112 | | 163.1 | LOS F | 75.5 | 567.6 | | | | |
| Intersection | 4008 | 8.7 | 4008 | 8.7 | | 1.212 | | 112.0 | LOS F | 75.5 | 567.6 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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

**Approach Lane Flows (veh/h)**

South: Fremantle Place

| Mov. From S To Exit: | L2 W | T1 N | R2 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 12 | - | - | 12 | 8.3 | 82 | 0.146 | 100 | 0.0 | 2 |
| Lane 2 | - | 10 | 17 | 27 | 7.4 | 84 | 0.321 | 100 | NA | NA |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Approach | 12 | 10 | 17 | 39 | 7.7 | | 0.321 | | | |

**East: Ti Rakau Drive (East)**

| Mov. From E To Exit: | L2 S | T1 W | R2 N | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 17 | 771 | - | 788 | 7.7 | 884 | 0.891 | 100 | NA | NA |
| Lane 2 | - | 756 | - | 756 | 7.7 | 848[1] | 0.891 | 100 | NA | NA |
| Lane 3 | - | 28 | - | 28 | 100.0 | 235 | 0.119 | 100 | 0.0 | 2 |
| Lane 4 | - | - | 259 | 259 | 5.6 | 261 | 0.994 | 82[6] | 87.8 | 2 |
| Lane 5 | - | - | 316 | 316 | 5.6 | 261 | 1.212 | 100 | 100.0 | 4 |
| Approach | 17 | 1555 | 575 | 2147 | 8.3 | | 1.212 | | | |

**North: Gossamer Drive**

| Mov. From N To Exit: | L2 E | T1 S | R2 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 167 | - | - | 167 | 8.7 | 321 | 0.518 | 100 | 0.0 | 2 |
| Lane 2 | 168 | - | - | 168 | 8.7 | 325 | 0.518 | 100 | NA | NA |
| Lane 3 | - | 10 | 49 | 59 | 5.1 | 72 | 0.821 | 100 | 25.0 | 2 |
| Approach | 335 | 10 | 49 | 394 | 8.1 | | 0.821 | | | |

**West: Ti Rakau Drive (West)**

| Mov. From W To Exit: | L2 N | T1 E | R2 S | U W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 116 | - | - | - | 116 | 1.7 | 815 | 0.142 | 100 | 24.8 | 2 |
| Lane 2 | - | 597 | - | - | 597 | 8.6 | 537[1] | 1.112 | 100 | NA | NA |
| Lane 3 | - | 630 | - | - | 630 | 8.6 | 566[1] | 1.112 | 100 | NA | NA |
| Lane 4 | - | - | 10 | 48 | 58 | 1.7 | 210 | 0.276 | 100 | 20.7 | 3 |
| Lane 5 | - | 27 | - | - | 27 | 100.0 | 239 | 0.113 | 100 | NA | NA |
| Approach | 116 | 1254 | 10 | 48 | 1428 | 9.5 | | 1.112 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 4008 | 8.7 | 1.212 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

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

6 Lane under-utilisation due to downstream effects

## Merge Analysis

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South Exit: Fremantle Place<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| East Exit: Ti Rakau Drive (East)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| North Exit: Gossamer Drive<br>Merge Type: **Zipper** | | | | | | | | | | | | |
| Exit Short Lane | 1 | 150 | 50.0 | 130 | 134 | 2.50 | 2.00 | 385 | 1646 | 0.234 | 0.0 | 0.1 |
| Merge Lane | 2 | - | 50.0 | 193 | 197 | 2.50 | 2.00 | 261 | 1568 | 0.166 | 0.0 | 0.1 |
| West Exit: Ti Rakau Drive (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |

| | | |
|---|---|---|
| Full Length Lane | 1 | Merge Analysis not applied. |
| Full Length Lane | 2 | Merge Analysis not applied. |
| Full Length Lane | 3 | Merge Analysis not applied. |

## LANE SUMMARY

### Site: 1.0 [1.0 Pakuranga Rd / Ti Rakau Dr (Site Folder: PM)]

### Network: N101 [PM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated    Cycle Time = 100 seconds (Site Practical Cycle Time)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total veh/h | DEMAND FLOWS HV ] % | ARRIVAL FLOWS [ Total veh/h | ARRIVAL FLOWS HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 85% BACK OF QUEUE [ Veh | 85% BACK OF QUEUE Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **South: Ti Rakau Drive** | | | | | | | | | | | | | | | |
| Lane 1 | 232 | 7.3 | 230 | 7.3 | 474 | 0.486 | 100 | 38.1 | LOS D | 8.6 | 63.7 | Full | 174 | 0.0 | 0.0 |
| Lane 2 | 232 | 7.3 | 230 | 7.3 | 474 | 0.486 | 100 | 38.1 | LOS D | 8.6 | 63.7 | Full | 174 | 0.0 | 0.0 |
| Lane 3 | 97 | 5.2 | 96 | 5.2 | 481 | 0.200 | 100 | 35.0 | LOS D | 3.3 | 23.8 | Short | 87 | 0.0 | NA |
| Lane 4 (B) | 23 | 100.0 | 23 | 100.0 | 285 | 0.081 | 100 | 25.2 | LOS C | 0.5 | 6.7 | Full | 174 | 0.0 | 0.0 |
| Approach | 584 | 10.6 | 580[N1] | 10.6 | | 0.486 | | 37.0 | LOS D | 8.6 | 63.7 | | | | |
| **East: Pakuranga Road (East)** | | | | | | | | | | | | | | | |
| Lane 1 | 65 | 10.8 | 61 | 10.8 | 484 | 0.126 | 100 | 32.9 | LOS C | 2.0 | 15.1 | Short | 21 | -2.7[N3] | NA |
| Lane 2 | 427 | 5.3 | 401 | 5.3 | 484[1] | 0.828 | 100 | 40.9 | LOS D | 17.7 | 129.6 | Full | 98 | 0.0 | 40.7 |
| Lane 3 | 480 | 5.3 | 450 | 5.3 | 544 | 0.828 | 100 | 41.4 | LOS D | 19.6[N4] | 143.2[N4] | Full | 98 | 0.0 | 50.0 |
| Approach | 972 | 5.7 | 912[N1] | 5.7 | | 0.828 | | 40.6 | LOS D | 19.6 | 143.2 | | | | |
| **West: Pakuranga Road (West)** | | | | | | | | | | | | | | | |
| Lane 1 (B) | 53 | 100.0 | 53 | 100.0 | 285 | 0.186 | 100 | 25.8 | LOS C | 1.3 | 16.4 | Full | 380 | 0.0 | 0.0 |
| Lane 2 | 440 | 5.1 | 440 | 5.1 | 544 | 0.808 | 100 | 39.8 | LOS D | 19.3 | 141.3 | Full | 380 | 0.0 | 0.0 |
| Lane 3 | 440 | 5.1 | 440 | 5.1 | 544 | 0.808 | 100 | 39.8 | LOS D | 19.3 | 141.3 | Full | 380 | 0.0 | 0.0 |
| Lane 4 | 358 | 8.5 | 358 | 8.5 | 440 | 0.814 | 100 | 47.7 | LOS D | 16.3 | 122.3 | Short | 178 | -2.7[N3] | NA |
| Lane 5 | 369 | 8.5 | 369 | 8.5 | 453 | 0.814 | 100 | 47.5 | LOS D | 16.7 | 125.3 | Short | 105 | 0.0 | NA |
| Approach | 1660 | 9.6 | 1660 | 9.6 | | 0.814 | | 42.8 | LOS D | 19.3 | 141.3 | | | | |
| Intersection | 3216 | 8.6 | 3152[N1] | 8.8 | | 0.828 | | 41.1 | LOS D | 19.6 | 143.2 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.
N3 Capacity Adjustment due to downstream lane blockage determined by the program.
N4 Average back of queue has been restricted to the available queue storage space.

**Approach Lane Flows (veh/h)**

**South: Ti Rakau Drive**

| Mov. From S To Exit: | L2 W | R2 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 230 | - | 230 | 7.3 | 474 | 0.486 | 100 | NA | NA |
| Lane 2 | 230 | - | 230 | 7.3 | 474 | 0.486 | 100 | NA | NA |
| Lane 3 | - | 96 | 96 | 5.2 | 481 | 0.200 | 100 | 0.0 | 2 |
| Lane 4 | 23 | - | 23 | 100.0 | 285 | 0.081 | 100 | NA | NA |
| Approach | 483 | 96 | 580 | 10.6 | | 0.486 | | | |

**East: Pakuranga Road (East)**

| Mov. From E To Exit: | L2 S | T1 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 61 | - | 61 | 10.8 | 484 | 0.126 | 100 | 0.0 | 2 |
| Lane 2 | - | 401 | 401 | 5.3 | 484[1] | 0.828 | 100 | NA | NA |
| Lane 3 | - | 450 | 450 | 5.3 | 544 | 0.828 | 100 | NA | NA |
| Approach | 61 | 851 | 912 | 5.7 | | 0.828 | | | |

West: Pakuranga Road (West)

| Mov. From W To Exit: | T1 E | R2 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | - | 53 | 53 | 100.0 | 285 | 0.186 | 100 | NA | NA |
| Lane 2 | 440 | - | 440 | 5.1 | 544 | 0.808 | 100 | NA | NA |
| Lane 3 | 440 | - | 440 | 5.1 | 544 | 0.808 | 100 | NA | NA |
| Lane 4 | - | 358 | 358 | 8.5 | 440 | 0.814 | 100 | 0.0 | 3 |
| Lane 5 | - | 369 | 369 | 8.5 | 453 | 0.814 | 100 | 31.2 | 4 |
| Approach | 880 | 780 | 1660 | 9.6 | | 0.814 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 3152 | 8.8 | 0.828 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

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

## Merge Analysis

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South Exit: Ti Rakau Drive<br>Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | |
| East Exit: Pakuranga Road (East)<br>Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | |
| West Exit: Pakuranga Road (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | |

# LANE SUMMARY

## Site: 2.1 [2.1 Pakuranga Plaza / Pakuranga Rd (Site Folder: PM)]

## Network: N101 [PM (Network Folder: General)]

Site Category: (None)
Give-Way (Two-Way)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total | HV ] | ARRIVAL FLOWS [ Total | HV ] | Cap. | Deg. Satn | Lane Util. | Aver. Delay | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] | Lane Config | Lane Length | Cap. Adj. | Prob. Block. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | veh/h | % | veh/h | % | veh/h | v/c | % | sec | | | m | | m | % | % |
| East: Pakuranga Road (East) | | | | | | | | | | | | | | | |
| Lane 1 | 479 | 5.8 | 448 | 5.9 | 1867 | 0.240 | 100 | 0.3 | LOS A | 0.0 | 0.0 | Full | 121 | 0.0 | 0.0 |
| Lane 2 | 481 | 5.7 | 449 | 5.7 | 1870 | 0.240 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 121 | 0.0 | 0.0 |
| Approach | 960 | 5.7 | 897 N1 | 5.8 | | 0.240 | | 0.1 | NA | 0.0 | 0.0 | | | | |
| West: Pakuranga Road (West) | | | | | | | | | | | | | | | |
| Lane 1 | 492 | 5.1 | 492 | 5.1 | 1878 | 0.262 | 100 | 0.0 | LOS A | 0.6 N5 | 4.7 N5 | Full | 108 | 0.0 | 0.0 |
| Lane 2 | 492 | 5.1 | 492 | 5.1 | 1878 | 0.262 | 100 | 0.0 | LOS A | 0.6 N5 | 4.1 N5 | Full | 108 | 0.0 | 0.0 |
| Approach | 984 | 5.1 | 983 N1 | 5.1 | | 0.262 | | 0.0 | NA | 0.6 | 4.7 | | | | |
| SouthWest: Pakuranga Plaza | | | | | | | | | | | | | | | |
| Lane 1 | 106 | 4.7 | 106 | 4.7 | 317 | 0.334 | 100 | 7.3 | LOS A | 0.6 | 4.2 | Full | 196 | -37.6 N7 | 0.0 |
| Approach | 106 | 4.7 | 106 | 4.7 | | 0.334 | | 7.3 | LOS A | 0.6 | 4.2 | | | | |
| Intersection | 2050 | 5.4 | 1986 N1 | 5.5 | | 0.334 | | 0.5 | NA | 0.6 | 4.7 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.
N5 Continuous Lane results determined by Back of Queue values of downstream lanes (proportional to lane movement flows).
N7 The capacity reduction has been determined from the queue blockage probability of a Site further downstream due to intermediate continuous lanes.

**Approach Lane Flows (veh/h)**

East: Pakuranga Road (East)

| Mov. From E To Exit: | L1 SW | T1 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 21 | 426 | 448 | 5.9 | 1867 | 0.240 | 100 | NA | NA |
| Lane 2 | - | 449 | 449 | 5.7 | 1870 | 0.240 | 100 | NA | NA |
| Approach | 21 | 875 | 897 | 5.8 | | 0.240 | | | |

West: Pakuranga Road (West)

| Mov. From W To Exit: | T1 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|
| Lane 1 | 492 | 492 | 5.1 | 1878 | 0.262 | 100 | NA | NA |
| Lane 2 | 492 | 492 | 5.1 | 1878 | 0.262 | 100 | NA | NA |
| Approach | 983 | 983 | 5.1 | | 0.262 | | | |

SouthWest: Pakuranga Plaza

| Mov. From SW To Exit: | L3 W | R1 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 42 | 64 | 106 | 4.7 | 317 | 0.334 | 100 | NA | NA |
| Approach | 42 | 64 | 106 | 4.7 | | 0.334 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 1986 | 5.5 | 0.334 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

| Merge Analysis | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | Opposing Flow Rate pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| East Exit: Pakuranga Road (East)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| West Exit: Pakuranga Road (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| SouthWest Exit: Pakuranga Plaza<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |

# LANE SUMMARY

## Site: 3.0 [3.0 Pakuranga Highway / Pakuranga Rd (Site Folder: PM)]    Network: N101 [PM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated    Cycle Time = 150 seconds (Site User-Given Phase Times)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **East: Pakuranga Road (East)** | | | | | | | | | | | | | | | |
| Lane 1 (B) | 9 | 100.0 | 9 | 100.0 | 701 | 0.013 | 100 | 15.6 | LOS B | 0.2 | 2.7 | Short | 24 | 0.0 | NA |
| Lane 2 | 518 | 5.1 | 518 | 5.1 | 1152[1] | 0.449 | 100 | 17.7 | LOS B | 16.6 | 121.2 | Full | 183 | 0.0 | 0.0 |
| Lane 3 | 528 | 5.1 | 528 | 5.1 | 1176 | 0.449 | 100 | 17.8 | LOS B | 17.1 | 124.7 | Full | 183 | 0.0 | 0.0 |
| Lane 4 | 418 | 5.0 | 418 | 5.0 | 386[1] | 1.082 | 100 | 169.7 | LOS F | 47.6 | 347.5 | Full | 183 | 0.0 | 75.0[8] |
| Lane 5 | 418 | 5.0 | 418 | 5.0 | 386[1] | 1.082 | 100 | 169.7 | LOS F | 47.6 | 347.5 | Short | 60 | 0.0 | NA |
| Approach | 1891 | 5.5 | 1891 | 5.5 | | 1.082 | | 84.9 | LOS F | 47.6 | 347.5 | | | | |
| **NorthWest: Pakuranga Road (West)** | | | | | | | | | | | | | | | |
| Lane 1 | 474 | 4.9 | 473 | 4.9 | 527 | 0.897 | 100 | 57.4 | LOS E | 24.2[N4] | 176.8[N4] | Full | 121 | 0.0 | 50.0 |
| Lane 2 | 474 | 4.9 | 473 | 4.9 | 527 | 0.897 | 100 | 57.4 | LOS E | 24.2[N4] | 176.8[N4] | Full | 121 | 0.0 | 50.0 |
| Lane 3 | 95 | 7.4 | 95 | 7.4 | 222 | 0.427 | 100 | 71.0 | LOS E | 5.9 | 43.6 | Short | 98 | 0.0 | NA |
| Approach | 1042 | 5.1 | 1041[N1] | 5.1 | | 0.897 | | 58.6 | LOS E | 24.2 | 176.8 | | | | |
| **West: Pakuranga Road Busway Link (Northbound)** | | | | | | | | | | | | | | | |
| Lane 1 (B) | 28 | 100.0 | 28 | 100.0 | 525 | 0.053 | 100 | 25.5 | LOS C | 1.0 | 13.5 | Full | 215 | 0.0 | 0.0 |
| Approach | 28 | 100.0 | 28 | 100.0 | | 0.053 | | 25.5 | LOS C | 1.0 | 13.5 | | | | |
| **SouthWest: Flyover** | | | | | | | | | | | | | | | |
| Lane 1 | 124 | 10.5 | 124 | 10.5 | 225 | 0.552 | 100 | 73.3 | LOS E | 7.8 | 59.5 | Short | 70 | 0.0 | NA |
| Lane 2 | 711 | 4.3 | 711 | 4.3 | 742[1] | 0.958 | 100 | 75.6 | LOS E | 54.4 | 395.0 | Full | 1162 | 0.0 | 0.0 |
| Lane 3 | 803 | 4.3 | 803 | 4.3 | 838 | 0.958 | 100 | 75.7 | LOS E | 64.0 | 464.6 | Full | 1162 | 0.0 | 0.0 |
| Approach | 1638 | 4.8 | 1638 | 4.8 | | 0.958 | | 75.5 | LOS E | 64.0 | 464.6 | | | | |
| Intersection | 4599 | 5.7 | 4598[N1] | 5.7 | | 1.082 | | 75.2 | LOS E | 64.0 | 464.6 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
8 Probability of Blockage has been set on the basis of a queue that overflows from a short lane.
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.
N4 Average back of queue has been restricted to the available queue storage space.

**Approach Lane Flows (veh/h)**

East: Pakuranga Road (East)

| Mov. From E To Exit: | L2 S | L1 SW | R1 NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 9 | - | - | 9 | 100.0 | 701 | 0.013 | 100 | 0.0 | 2 |
| Lane 2 | - | 518 | - | 518 | 5.1 | 1152[1] | 0.449 | 100 | NA | NA |
| Lane 3 | - | 528 | - | 528 | 5.1 | 1176 | 0.449 | 100 | NA | NA |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 4 | - | - | 418 | 418 | 5.0 | 386[1] | 1.082 | 100 | NA | NA |
| Lane 5 | - | - | 418 | 418 | 5.0 | 386[1] | 1.082 | 100 | 100.0 | 4 |
| Approach | 9 | 1046 | 836 | 1891 | 5.5 | | 1.082 | | | |

NorthWest: Pakuranga Road (West)

| Mov. From NW To Exit: | L1 E | R2 SW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 473 | - | 473 | 4.9 | 527 | 0.897 | 100 | NA | NA |
| Lane 2 | 473 | - | 473 | 4.9 | 527 | 0.897 | 100 | NA | NA |
| Lane 3 | - | 95 | 95 | 7.4 | 222 | 0.427 | 100 | 0.0 | 2 |
| Approach | 946 | 95 | 1041 | 5.1 | | 0.897 | | | |

West: Pakuranga Road Busway Link (Northbound)

| Mov. From W To Exit: | T1 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|
| Lane 1 | 28 | 28 | 100.0 | 525 | 0.053 | 100 | NA | NA |
| Approach | 28 | 28 | 100.0 | | 0.053 | | | |

SouthWest: Flyover

| Mov. From SW To Exit: | L2 NW | R1 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 124 | - | 124 | 10.5 | 225 | 0.552 | 100 | 0.3 | 2 |
| Lane 2 | - | 711 | 711 | 4.3 | 742[1] | 0.958 | 100 | NA | NA |
| Lane 3 | - | 803 | 803 | 4.3 | 838 | 0.958 | 100 | NA | NA |
| Approach | 124 | 1514 | 1638 | 4.8 | | 0.958 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 4598 | 5.7 | 1.082 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

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

## Merge Analysis

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South Exit: Pakuranga Road Busway Link (Southbound) Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| East Exit: Pakuranga Road (East) Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | |
| NorthWest Exit: Pakuranga Road (West) Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | |
| SouthWest Exit: Flyover Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | |

# CCG LANE SUMMARY

## Common Control Group: CCG3 [Aylesbury/ WR/ Reeves Rd] Network: N101 [PM (Network Folder: General)]

EQUISAT (Fixed-Time/SCATS) Isolated     Cycle Time = 108 seconds (CCG User-Given Phase Times)

**Lane Use and Performance (CCG)**

| | DEMAND FLOWS [ Total | HV ] | ARRIVAL FLOWS [ Total | HV ] | Cap. | Deg. Satn | Lane Util. | Aver. Delay | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] | Lane Config | Lane Length | Cap. Adj. | Prob. Block. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | veh/h | % | veh/h | % | veh/h | v/c | % | sec | | | m | | m | % | % |
| Site: 5.2v [5.2 Aylesbury St/ Reeves Road/ Busway Link signalised] | | | | | | | | | | | | | | | |
| SouthEast: Reeves Road (East) | | | | | | | | | | | | | | | |
| Lane 1 | 50 | 6.0 | 49 | 6.0 | 198 | 0.246 | 100 | 26.9 | LOS C | 1.3 | 9.2 | Full | 27 | 0.0 | 0.0 |
| Approach | 50 | 6.0 | 49 N1 | 6.0 | | 0.246 | | 26.9 | LOS C | 1.3 | 9.2 | | | | |
| East: Pakuranga Rd Busway Link (Northbound) | | | | | | | | | | | | | | | |
| Lane 1 (B) | 9 | 100.0 | 9 | 100.0 | 116 | 0.078 | 100 | 54.1 | LOS D | 0.4 | 5.3 | Full | 203 | 0.0 | 0.0 |
| Approach | 9 | 100.0 | 9 | 100.0 | | 0.078 | | 54.1 | LOS D | 0.4 | 5.3 | | | | |
| NorthWest: Aylesbury Street | | | | | | | | | | | | | | | |
| Lane 1 | 126 | 4.0 | 126 | 4.0 | 173 | 0.724 | 100 | 51.1 | LOS D | 6.2 | 45.0 | Full | 284 | -47.9 N3 | 0.0 |
| Approach | 126 | 4.0 | 126 | 4.0 | | 0.724 | | 51.1 | LOS D | 6.2 | 45.0 | | | | |
| SouthWest: Reeves Road (South) | | | | | | | | | | | | | | | |
| Lane 1 | 202 | 21.3 | 199 | 21.5 | 264 | 0.751 | 100 | 45.6 | LOS D | 9.5 | 78.9 | Full | 180 | -44.7 N3 | 0.0 |
| Approach | 202 | 21.3 | 199 N1 | 21.5 | | 0.751 | | 45.6 | LOS D | 9.5 | 78.9 | | | | |
| Intersection | 387 | 15.5 | 382 N1 | 15.7 | | 0.751 | | 45.2 | LOS D | 9.5 | 78.9 | | | | |
| Site: 7.3v [7.3 William Roberts Rd / Reeves Rd signalised] | | | | | | | | | | | | | | | |
| SouthEast: Reeves Rd (East) | | | | | | | | | | | | | | | |
| Lane 1 | 121 | 4.1 | 121 | 4.1 | 200 | 0.604 | 100 | 56.2 | LOS E | 5.7 | 41.3 | Full | 810 | 0.0 | 0.0 |
| Lane 2 | 28 | 3.6 | 28 | 3.6 | 208 | 0.134 | 100 | 50.3 | LOS D | 1.2 | 8.8 | Short | 45 | 0.0 | NA |
| Approach | 149 | 4.0 | 149 | 4.0 | | 0.604 | | 55.1 | LOS E | 5.7 | 41.3 | | | | |
| NorthWest: Reeves Rd (West) | | | | | | | | | | | | | | | |
| Lane 1 | 283 | 7.1 | 280 | 7.1 | 591 | 0.474 | 100 | 32.0 | LOS C | 5.3 N4 | 39.5 N4 | Full | 27 | 0.0 | 50.0 |
| Approach | 283 | 7.1 | 280 N1 | 7.1 | | 0.474 | | 32.0 | LOS C | 5.3 | 39.5 | | | | |
| SouthWest: William Roberts Road (South) | | | | | | | | | | | | | | | |
| Lane 1 | 440 | 5.9 | 415 | 6.0 | 511 | 0.811 | 100 | 45.5 | LOS D | 19.7 | 145.3 | Full | 223 | 0.0 | 0.0 |
| Approach | 440 | 5.9 | 415 N1 | 6.0 | | 0.811 | | 45.5 | LOS D | 19.7 | 145.3 | | | | |
| Intersection | 872 | 6.0 | 844 N1 | 6.2 | | 0.811 | | 42.7 | LOS D | 19.7 | 145.3 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.
N3 Capacity Adjustment due to downstream lane blockage determined by the program.
N4 Average back of queue has been restricted to the available queue storage space.

**Approach Lane Flows (CCG) (veh/h)**

Site: 5.2v [5.2 Aylesbury St/ Reeves Road/ Busway Link signalised]

| SouthEast: Reeves Road (East) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Mov. From SE To Exit: | L2 SW | T1 NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 37 | 12 | 49 | 6.0 | 198 | 0.246 | 100 | NA | NA |
| Approach | 37 | 12 | 49 | 6.0 | | 0.246 | | | |

| East: Pakuranga Rd Busway Link (Northbound) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Mov. From E To Exit: | L1 SW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 9 | 9 | 100.0 | 116 | 0.078 | 100 | NA | NA |
| Approach | 9 | 9 | 100.0 | | 0.078 | | | |

| NorthWest: Aylesbury Street | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Mov. From NW To Exit: | T1 SE | R2 SW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 116 | 10 | 126 | 4.0 | 173 | 0.724 | 100 | NA | NA |
| Approach | 116 | 10 | 126 | 4.0 | | 0.724 | | | |

| SouthWest: Reeves Road (South) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Mov. From SW To Exit: | L2 NW | T1 NE | R2 SE | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 10 | 28 | 160 | 199 | 21.5 | 264 | 0.751 | 100 | NA | NA |
| Approach | 10 | 28 | 160 | 199 | 21.5 | | 0.751 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 382 | 15.7 | 0.751 |

Site: 7.3v [7.3 William Roberts Rd / Reeves Rd signalised]

| SouthEast: Reeves Rd (East) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Mov. From SE To Exit: | L2 SW | T1 NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 121 | - | 121 | 4.1 | 200 | 0.604 | 100 | NA | NA |
| Lane 2 | - | 28 | 28 | 3.6 | 208 | 0.134 | 100 | 0.0 | 1 |
| Approach | 121 | 28 | 149 | 4.0 | | 0.604 | | | |

| NorthWest: Reeves Rd (West) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Mov. From NW To Exit: | T1 SE | R2 SW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 212 | 68 | 280 | 7.1 | 591 | 0.474 | 100 | NA | NA |
| Approach | 212 | 68 | 280 | 7.1 | | 0.474 | | | |

| SouthWest: William Roberts Road (South) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Mov. From SW To Exit: | L2 NW | R2 SE | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 20 | 395 | 415 | 6.0 | 511 | 0.811 | 100 | NA | NA |

| | | | | | | |
|---|---|---|---|---|---|---|
| Approach | 20 | 395 | 415 | 6.0 | | 0.811 |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 844 | 6.2 | 0.811 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

| Merge Analysis (CCG) | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | Opposing Flow Rate pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site: 5.2v [5.2 Aylesbury St/ Reeves Road/ Busway Link signalised] | | | | | | | | | | | | |
| SouthEast Exit: Reeves Road (East)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| NorthEast Exit: Pakuranga Rd Busway Link (Southbound)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| NorthWest Exit: Aylesbury Street<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| SouthWest Exit: Reeves Road (South)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Site: 7.3v [7.3 William Roberts Rd / Reeves Rd signalised] | | | | | | | | | | | | |
| SouthEast Exit: Reeves Rd (East)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| NorthWest Exit: Reeves Rd (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| SouthWest Exit: William Roberts Road (South)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |

# LANE SUMMARY

## Site: 7.1 [7.1 William Roberts Rd / Cortina Pl (Site Folder: PM)]

## Network: N101 [PM (Network Folder: General)]

Site Category: (None)
Give-Way (Two-Way)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NorthEast: William Roberts Road (North) | | | | | | | | | | | | | | | |
| Lane 1 | 192 | 6.3 | 191 | 6.2 | 1767 | 0.108 | 100 | 0.7 | LOS A | 0.1 | 0.9 | Full | 223 | 0.0 | 0.0 |
| Approach | 192 | 6.3 | 191 [N1] | 6.2 | | 0.108 | | 0.7 | NA | 0.1 | 0.9 | | | | |
| NorthWest: Cortina Place | | | | | | | | | | | | | | | |
| Lane 1 | 229 | 10.5 | 228 | 10.5 | 732 | 0.312 | 100 | 6.3 | LOS A | 1.1 | 8.3 | Full | 177 | 0.0 | 0.0 |
| Approach | 229 | 10.5 | 228 [N1] | 10.5 | | 0.312 | | 6.3 | LOS A | 1.1 | 8.3 | | | | |
| SouthWest: William Roberts Road (South) | | | | | | | | | | | | | | | |
| Lane 1 | 563 | 6.0 | 529 | 6.1 | 1805 | 0.293 | 100 | 0.5 | LOS A | 0.0 | 0.0 | Full | 110 | 0.0 | 0.0 |
| Approach | 563 | 6.0 | 529 [N1] | 6.1 | | 0.293 | | 0.5 | NA | 0.0 | 0.0 | | | | |
| Intersection | 984 | 7.1 | 948 [N1] | 7.4 | | 0.312 | | 1.9 | NA | 1.1 | 8.3 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

**Approach Lane Flows (veh/h)**

NorthEast: William Roberts Road (North)

| Mov. From NE To Exit: | T1 SW | R2 NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 178 | 13 | 191 | 6.2 | 1767 | 0.108 | 100 | NA | NA |
| Approach | 178 | 13 | 191 | 6.2 | | 0.108 | | | |

NorthWest: Cortina Place

| Mov. From NW To Exit: | L2 NE | R2 SW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 31 | 197 | 228 | 10.5 | 732 | 0.312 | 100 | NA | NA |
| Approach | 31 | 197 | 228 | 10.5 | | 0.312 | | | |

SouthWest: William Roberts Road (South)

| Mov. From SW To Exit: | L2 NW | T1 NE | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 122 | 407 | 529 | 6.1 | 1805 | 0.293 | 100 | NA | NA |
| Approach | 122 | 407 | 529 | 6.1 | | 0.293 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|

| | | | |
|---|---|---|---|
| Intersection | 948 | 7.4 | 0.312 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

| Merge Analysis | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NorthEast Exit: William Roberts Road (North)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| NorthWest Exit: Cortina Place<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| SouthWest Exit: William Roberts Road (South)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |

# LANE SUMMARY

## Site: 4.0 [4.0 Palm Ave / Aylesbury St (Site Folder: PM)]

## Network: N101 [PM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated    Cycle Time = 149 seconds (Site User-Given Phase Times)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total veh/h | DEMAND FLOWS HV ] % | ARRIVAL FLOWS [ Total veh/h | ARRIVAL FLOWS HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 85% BACK OF QUEUE [ Veh | 85% BACK OF QUEUE Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **South: Ti Rakau Drive (East)** | | | | | | | | | | | | | | | |
| Lane 1 | 283 | 8.3 | 282 | 8.3 | 420 | 0.670 | 100 | 56.5 | LOS E | 14.9 | 112.1 | Full | 110 | 0.0 | 16.7 |
| Lane 2 | 353 | 7.2 | 351 | 7.2 | 524 [1] | 0.670 | 100 | 49.9 | LOS D | 20.0 | 148.5 | Full | 110 | 0.0 | 42.6 |
| Lane 3 | 49 | 6.1 | 49 | 6.1 | 345 | 0.141 | 100 | 58.0 | LOS E | 2.6 | 19.3 | Short | 86 | 0.0 | NA |
| Lane 4 (B) | 23 | 100.0 | 23 | 100.0 | 313 | 0.074 | 100 | 15.7 | LOS B | 0.5 | 6.2 | Full | 110 | 0.0 | 0.0 |
| Approach | 708 | 10.6 | 704 [N1] | 10.6 | | 0.670 | | 52.0 | LOS D | 20.0 | 148.5 | | | | |
| **East: Aylesbury Street** | | | | | | | | | | | | | | | |
| Lane 1 | 36 | 5.6 | 35 | 5.6 | 337 | 0.104 | 100 | 54.9 | LOS D | 1.9 | 13.7 | Short | 30 | 0.0 | NA |
| Lane 2 | 84 | 6.0 | 82 | 6.0 | 347 | 0.235 | 100 | 55.7 | LOS E | 4.5 | 33.0 | Full | 40 | 0.0 | 0.0 |
| Approach | 120 | 5.8 | 117 [N1] | 5.8 | | 0.235 | | 55.5 | LOS E | 4.5 | 33.0 | | | | |
| **North: Ti Rakau Drive (West)** | | | | | | | | | | | | | | | |
| Lane 1 (B) | 53 | 100.0 | 53 | 100.0 | 313 | 0.170 | 100 | 16.2 | LOS B | 1.2 | 15.1 | Full | 174 | 0.0 | 0.0 |
| Lane 2 | 290 | 9.7 | 289 | 9.7 | 336 | 0.858 | 100 | 76.3 | LOS E | 20.0 | 151.9 | Short | 100 | 0.0 | NA |
| Lane 3 | 250 | 8.8 | 249 | 8.8 | 283 | 0.879 | 100 | 77.7 | LOS E | 17.8 | 133.8 | Full | 174 | 0.0 | 2.7 [8] |
| Lane 4 | 225 | 8.8 | 224 | 8.8 | 255 [1] | 0.879 | 100 | 77.4 | LOS E | 15.8 | 119.2 | Full | 174 | 0.0 | 0.0 |
| Lane 5 | 30 | 3.3 | 30 | 3.3 | 109 | 0.274 | 100 | 79.8 | LOS E | 1.9 | 14.0 | Short | 14 | 0.0 | NA |
| Approach | 848 | 14.6 | 844 [N1] | 14.6 | | 0.879 | | 73.3 | LOS E | 20.0 | 151.9 | | | | |
| **West: Palm Avenue** | | | | | | | | | | | | | | | |
| Lane 1 | 87 | 2.3 | 87 | 2.3 | 284 | 0.306 | 100 | 64.9 | LOS E | 5.1 | 36.2 | Full | 87 | 0.0 | 0.0 |
| Approach | 87 | 2.3 | 87 | 2.3 | | 0.306 | | 64.9 | LOS E | 5.1 | 36.2 | | | | |
| Intersection | 1763 | 11.8 | 1752 [N1] | 11.9 | | 0.879 | | 63.1 | LOS E | 20.0 | 151.9 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
8 Probability of Blockage has been set on the basis of a queue that overflows from a short lane.
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

**Approach Lane Flows (veh/h)**

South: Ti Rakau Drive (East)

| Mov. From S To Exit: | L2 W | T1 N | R2 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 149 | 132 | - | 282 | 8.3 | 420 | 0.670 | 100 | NA | NA |
| Lane 2 | - | 351 | - | 351 | 7.2 | 524 [1] | 0.670 | 100 | NA | NA |
| Lane 3 | - | - | 49 | 49 | 6.1 | 345 | 0.141 | 100 | 0.0 | 2 |
| Lane 4 | - | 23 | - | 23 | 100.0 | 313 | 0.074 | 100 | NA | NA |

| Mov. From E To Exit: | L2 S | T1 W | R2 N | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Approach | 149 | 506 | 49 | 704 | 10.6 | | 0.670 | | | |
| **East: Aylesbury Street** | | | | | | | | | | |
| Lane 1 | 35 | - | - | 35 | 5.6 | 337 | 0.104 | 100 | 0.0 | 2 |
| Lane 2 | - | 19 | 62 | 82 | 6.0 | 347 | 0.235 | 100 | NA | NA |
| Approach | 35 | 19 | 62 | 117 | 5.8 | | 0.235 | | | |

North: Ti Rakau Drive (West)

| Mov. From N To Exit: | L2 E | T1 S | R2 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | - | 53 | - | 53 | 100.0 | 313 | 0.170 | 100 | NA | NA |
| Lane 2 | 289 | - | - | 289 | 9.7 | 336 | 0.858 | 100 | 53.7 | 3 |
| Lane 3 | - | 249 | - | 249 | 8.8 | 283 | 0.879 | 100 | NA | NA |
| Lane 4 | - | 224 | - | 224 | 8.8 | 255[1] | 0.879 | 100 | NA | NA |
| Lane 5 | - | - | 30 | 30 | 3.3 | 109 | 0.274 | 100 | 14.8 | 4 |
| Approach | 289 | 526 | 30 | 844 | 14.6 | | 0.879 | | | |

West: Palm Avenue

| Mov. From W To Exit: | L2 N | T1 E | R2 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 19 | 32 | 36 | 87 | 2.3 | 284 | 0.306 | 100 | NA | NA |
| Approach | 19 | 32 | 36 | 87 | 2.3 | | 0.306 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 1752 | 11.9 | 0.879 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

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

## Merge Analysis

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South Exit: Ti Rakau Drive (East) Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | |
| East Exit: Aylesbury Street Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| North Exit: Ti Rakau Drive (West) Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | |
| West Exit: Palm Avenue Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |

# LANE SUMMARY

## Site: 5.0 [5.0 Pakuranga Highway / Reeves Rd (Site Folder: PM)]

## Network: N101 [PM (Network Folder: General)]

Site Category: (None)
Single Point Interchange (Signals) - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 131 seconds (Site User-Given Phase Times)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast: Ti Rakau Drive (East) | | | | | | | | | | | | | | | |
| Lane 1 | 430 | 8.5 | 427 | 8.5 | 1016 [1] | 0.421 | 100 | 16.0 | LOS B | 11.1 | 83.6 | Short | 50 | 0.0 | NA |
| Lane 2 | 430 | 8.5 | 427 | 8.5 | 1016 [1] | 0.421 | 100 | 16.0 | LOS B | 11.1 | 83.6 | Full | 90 | 0.0 | 8.4 [8] |
| Lane 3 | 316 | 7.7 | 314 | 7.7 | 564 | 0.557 | 100 | 35.5 | LOS D | 14.3 | 106.6 | Full | 90 | -16.7 [N3] | 30.5 |
| Lane 4 | 218 | 7.7 | 217 | 7.7 | 389 | 0.557 | 100 | 36.0 | LOS D | 10.0 | 74.6 | Full | 90 | -42.6 [N3] | 0.0 |
| Lane 5 (B) | 13 | 100.0 | 13 | 100.0 | 118 | 0.110 | 100 | 32.2 | LOS C | 0.4 | 5.3 | Full | 90 | 0.0 | 0.0 |
| Approach | 1407 | 9.0 | 1398 [N1] | 9.0 | | 0.557 | | 23.6 | LOS C | 14.3 | 106.6 | | | | |
| NorthEast: Reeves Road | | | | | | | | | | | | | | | |
| Lane 1 (B) | 9 | 100.0 | 9 | 100.0 | 243 | 0.037 | 100 | 33.5 | LOS C | 0.3 | 4.1 | Full | 50 | 0.0 | 0.0 |
| Approach | 9 | 100.0 | 9 | 100.0 | | 0.037 | | 33.5 | LOS C | 0.3 | 4.1 | | | | |
| NorthWest: Ti Rakau Drive (West) | | | | | | | | | | | | | | | |
| Lane 1 (B) | 53 | 100.0 | 53 | 100.0 | 173 | 0.306 | 100 | 32.2 | LOS C | 1.6 | 21.4 | Full | 110 | 0.0 | 0.0 |
| Lane 2 | 229 | 7.9 | 227 | 7.9 | 563 | 0.403 | 100 | 38.6 | LOS D | 10.3 | 76.6 | Full | 110 | 0.0 | 0.0 |
| Lane 3 | 229 | 7.9 | 227 | 7.9 | 563 | 0.403 | 100 | 38.6 | LOS D | 10.3 | 76.6 | Full | 110 | 0.0 | 0.0 |
| Lane 4 | 71 | 11.3 | 71 | 11.3 | 300 | 0.235 | 100 | 55.3 | LOS E | 3.5 | 26.9 | Short | 71 | 0.0 | NA |
| Approach | 581 | 16.7 | 578 [N1] | 16.7 | | 0.403 | | 40.1 | LOS D | 10.3 | 76.6 | | | | |
| SouthWest: Pakuranga Highway | | | | | | | | | | | | | | | |
| Lane 1 | 154 | 7.1 | 154 | 7.1 | 613 | 0.251 | 100 | 25.5 | LOS C | 4.6 | 33.8 | Short | 72 | -16.7 [N3] | NA |
| Lane 2 | 348 | 7.0 | 348 | 7.0 | 380 [1] | 0.916 | 100 | 77.7 | LOS E | 23.0 | 170.9 | Short | 143 | 0.0 | NA |
| Lane 3 | 387 | 7.0 | 387 | 7.0 | 423 | 0.916 | 100 | 77.8 | LOS E | 26.0 | 192.9 | Short | 240 | 0.0 | NA |
| Lane 4 | 387 | 7.0 | 387 | 7.0 | 423 | 0.916 | 100 | 77.8 | LOS E | 26.0 | 192.9 | Full | 623 | 0.0 | 0.0 |
| Approach | 1277 | 7.0 | 1277 | 7.0 | | 0.916 | | 71.5 | LOS E | 26.0 | 192.9 | | | | |
| Intersection | 3274 | 9.9 | 3261 [N1] | 9.9 | | 0.916 | | 45.3 | LOS D | 26.0 | 192.9 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
8 Probability of Blockage has been set on the basis of a queue that overflows from a short lane.
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.
N3 Capacity Adjustment due to downstream lane blockage determined by the program.

**Approach Lane Flows (veh/h)**

SouthEast: Ti Rakau Drive (East)

| Mov. From SE To Exit: | L2 SW | T1 NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 427 | - | 427 | 8.5 | 1016[1] | 0.421 | 100 | 62.8 | 2 |
| Lane 2 | 427 | - | 427 | 8.5 | 1016[1] | 0.421 | 100 | NA | NA |
| Lane 3 | - | 314 | 314 | 7.7 | 564 | 0.557 | 100 | NA | NA |
| Lane 4 | - | 217 | 217 | 7.7 | 389 | 0.557 | 100 | NA | NA |
| Lane 5 | - | 13 | 13 | 100.0 | 118 | 0.110 | 100 | NA | NA |
| Approach | 854 | 543 | 1398 | 9.0 | | 0.557 | | | |

NorthEast: Reeves Road

| Mov. From NE To Exit: | R2 NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|
| Lane 1 | 9 | 9 | 100.0 | 243 | 0.037 | 100 | NA | NA |
| Approach | 9 | 9 | 100.0 | | 0.037 | | | |

NorthWest: Ti Rakau Drive (West)

| Mov. From NW To Exit: | L2 NE | T1 SE | R2 SW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 28 | 25 | - | 53 | 100.0 | 173 | 0.306 | 100 | NA | NA |
| Lane 2 | - | 227 | - | 227 | 7.9 | 563 | 0.403 | 100 | NA | NA |
| Lane 3 | - | 227 | - | 227 | 7.9 | 563 | 0.403 | 100 | NA | NA |
| Lane 4 | - | - | 71 | 71 | 11.3 | 300 | 0.235 | 100 | 0.0 | 3 |
| Approach | 28 | 479 | 71 | 578 | 16.7 | | 0.403 | | | |

SouthWest: Pakuranga Highway

| Mov. From SW To Exit: | L2 NW | R2 SE | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 154 | - | 154 | 7.1 | 613 | 0.251 | 100 | 0.0 | 2 |
| Lane 2 | - | 348 | 348 | 7.0 | 380[1] | 0.916 | 100 | 31.3 | 3 |
| Lane 3 | - | 387 | 387 | 7.0 | 423 | 0.916 | 100 | 0.0 | 4 |
| Lane 4 | - | 387 | 387 | 7.0 | 423 | 0.916 | 100 | NA | NA |
| Approach | 154 | 1123 | 1277 | 7.0 | | 0.916 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 3261 | 9.9 | 0.916 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

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

**Merge Analysis**

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast Exit: Ti Rakau Drive (East)<br>Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 4 | Merge Analysis not applied. | | | | | | | | | |
| NorthEast Exit: Reeves Road<br>Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| NorthWest Exit: Ti Rakau Drive (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | | |
| SouthWest Exit: Pakuranga Highway<br>Merge Type: **Zipper** | | | | | | | | | | | | |
| Exit Short Lane | 1 | 280 | 50.0 | 249 | 260 | 2.50 | 2.00 | 427 | 1485 | 0.288 | 0.0 | 0.2 |
| Merge Lane | 2 | - | 50.0 | 214 | 223 | 2.50 | 2.00 | 498 | 1535 | 0.324 | 0.0 | 0.1 |
| SouthWest Exit: Pakuranga Highway<br>Merge Type: **Zipper** | | | | | | | | | | | | |
| Exit Short Lane | 3 | 10 | 50.0 | 214 | 223 | 2.50 | 2.00 | 71 | 1534 | 0.046 | 0.0 | 0.1 |
| Merge Lane | 2 | - | 50.0 | 35 | 37 | 2.50 | 2.00 | 427 | 1758 | 0.243 | 0.0 | 0.0 |

# CCG LANE SUMMARY

## Common Control Group: CCG2 [WRR / Mattson]

## Network: N101 [PM (Network Folder: General)]

EQUISAT (Fixed-Time/SCATS) Isolated  Cycle Time = 69 seconds (CCG User-Given Phase Times)

**Lane Use and Performance (CCG)**

| | DEMAND FLOWS [ Total | HV ] | ARRIVAL FLOWS [ Total | HV ] | Cap. | Deg. Satn | Lane Util. | Aver. Delay | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] | Lane Config | Lane Length | Cap. Adj. | Prob. Block. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | veh/h | % | veh/h | % | veh/h | v/c | % | sec | | | m | | m | % | % |
| **Site: 7.0 [7.0 William Roberts Rd / Ti Rakau Dr]** | | | | | | | | | | | | | | | |
| **SouthEast: Ti Rakau Drive (East)** | | | | | | | | | | | | | | | |
| Lane 1 | 436 | 8.1 | 436 | 8.1 | 801 | 0.545 | 100 | 12.4 | LOS B | 7.7 | 57.9 | Full | 60 | 0.0 | 11.8 |
| Lane 2 | 436 | 8.1 | 436 | 8.1 | 801 | 0.545 | 100 | 4.7 | LOS A | 4.1 | 30.6 | Full | 60 | 0.0 | 0.0 |
| Lane 3 | 436 | 8.1 | 436 | 8.1 | 801 | 0.545 | 100 | 4.7 | LOS A | 4.1 | 30.6 | Full | 60 | 0.0 | 0.0 |
| Lane 4 | 198 | 7.1 | 198 | 7.1 | 243[1] | 0.814 | 100 | 39.4 | LOS D | 6.6 | 48.7 | Short | 20 | 0.0 | NA |
| Lane 5 (B) | 13 | 100.0 | 13 | 100.0 | 519 | 0.025 | 100 | 2.8 | LOS A | 0.1 | 0.7 | Full | 60 | 0.0 | 0.0 |
| Approach | 1520 | 8.7 | 1520 | 8.7 | | 0.814 | | 11.4 | LOS B | 7.7 | 57.9 | | | | |
| **NorthEast: William Roberts Road Extension** | | | | | | | | | | | | | | | |
| Lane 1 | 234 | 9.0 | 233 | 9.0 | 453 | 0.515 | 100 | 26.2 | LOS C | 6.2 | 46.7 | Short | 80 | 0.0 | NA |
| Lane 2 | 138 | 6.5 | 137 | 6.5 | 128 | 1.075 | 100 | 119.8 | LOS F | 9.0 | 66.4 | Full | 110 | 0.0 | 0.0 |
| Approach | 372 | 8.1 | 371[N1] | 8.1 | | 1.075 | | 60.9 | LOS E | 9.0 | 66.4 | | | | |
| **NorthWest: Ti Rakau Drive (West)** | | | | | | | | | | | | | | | |
| Lane 1 | 369 | 5.7 | 368 | 5.7 | 335 | 1.101 | 100 | 131.1 | LOS F | 21.3[N4] | 156.4[N4] | Full | 107 | 0.0 | 50.0 |
| Lane 2 | 498 | 7.8 | 497 | 7.8 | 573 | 0.868 | 79[5] | 31.6 | LOS C | 17.9 | 133.5 | Full | 107 | -28.6[N3] | 35.3 |
| Lane 3 | 698 | 7.8 | 697 | 7.8 | 803 | 0.868 | 79[5] | 28.3 | LOS C | 20.9[N4] | 156.4[N4] | Full | 107 | 0.0 | 50.0 |
| Lane 4 (B) | 25 | 100.0 | 25 | 100.0 | 519 | 0.048 | 100 | 2.8 | LOS A | 0.1 | 1.3 | Full | 107 | 0.0 | 0.0 |
| Approach | 1590 | 8.7 | 1587[N1] | 8.7 | | 1.101 | | 52.8 | LOS D | 21.3 | 156.4 | | | | |
| Intersection | 3482 | 8.7 | 3478[N1] | 8.7 | | 1.101 | | 35.6 | LOS D | 21.3 | 156.4 | | | | |
| **Site: 7.5 [7.5 Mattson Rd/ Ti Rakau Dr]** | | | | | | | | | | | | | | | |
| **SouthEast: Ti Rakau Drive (East)** | | | | | | | | | | | | | | | |
| Lane 1 | 226 | 6.9 | 226 | 6.9 | 238 | 0.949 | 100 | 58.4 | LOS E | 8.9 | 65.9 | Short | 25 | -7.9[N3] | NA |
| Lane 2 | 578 | 8.0 | 578 | 8.0 | 610[1] | 0.949 | 100 | 47.2 | LOS D | 24.1 | 180.0 | Full | 143 | 0.0 | 36.1 |
| Lane 3 | 761 | 8.0 | 761 | 8.0 | 802 | 0.949 | 100 | 46.1 | LOS D | 27.9[N4] | 209.0[N4] | Full | 143 | 0.0 | 50.0 |
| Lane 4 (B) | 13 | 100.0 | 13 | 100.0 | 511 | 0.025 | 100 | 12.1 | LOS B | 0.2 | 2.9 | Full | 143 | 0.0 | 0.0 |
| Approach | 1578 | 8.6 | 1578 | 8.6 | | 0.949 | | 48.0 | LOS D | 27.9 | 209.0 | | | | |
| **NorthWest: Ti Rakau Drive (West)** | | | | | | | | | | | | | | | |
| Lane 1 | 164 | 8.0 | 164 | 8.0 | 802 | 0.204 | 27[6] | 24.1 | LOS C | 4.9 | 36.4 | Full | 60 | 0.0 | 0.0 |
| Lane 2 | 603 | 8.0 | 601 | 8.0 | 802 | 0.750 | 100 | 6.8 | LOS A | 9.3 | 69.6 | Full | 60 | 0.0 | 28.6 |
| Lane 3 | 603 | 8.0 | 601 | 8.0 | 802 | 0.750 | 100 | 3.5 | LOS A | 5.4 | 40.6 | Full | 60 | 0.0 | 0.0 |
| Lane 4 | 60 | 6.7 | 60 | 6.7 | 460 | 0.130 | 100 | 32.6 | LOS C | 1.8 | 13.4 | Short | 25 | 0.0 | NA |
| Lane 5 (B) | 25 | 100.0 | 25 | 100.0 | 511 | 0.049 | 100 | 3.8 | LOS A | 0.1 | 1.8 | Full | 60 | 0.0 | 0.0 |
| Approach | 1454 | 9.5 | 1451[N1] | 9.5 | | 0.750 | | 8.4 | LOS A | 9.3 | 69.6 | | | | |
| **SouthWest: Mattson Road** | | | | | | | | | | | | | | | |
| Lane 1 | 26 | 3.8 | 26 | 3.8 | 414 | 0.063 | 100 | 25.6 | LOS C | 0.6 | 4.3 | Full | 282 | -11.8[N3] | 0.0 |
| Lane 2 | 38 | 7.9 | 38 | 7.9 | 127 | 0.300 | 100 | 40.3 | LOS D | 1.2 | 8.9 | Full | 282 | 0.0 | 0.0 |
| Approach | 64 | 6.3 | 64 | 6.3 | | 0.300 | | 34.3 | LOS C | 1.2 | 8.9 | | | | |
| Intersection | 3096 | 8.9 | 3093[N1] | 9.0 | | 0.949 | | 29.1 | LOS C | 27.9 | 209.0 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
5 Lane under-utilisation found by the program
6 Lane under-utilisation due to downstream effects
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.
N3 Capacity Adjustment due to downstream lane blockage determined by the program.
N4 Average back of queue has been restricted to the available queue storage space.

## Approach Lane Flows (CCG) (veh/h)

Site: 7.0 [7.0 William Roberts Rd / Ti Rakau Dr]

SouthEast: Ti Rakau Drive (East)

| Mov. From SE To Exit: | T1 NW | R2 NE | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 436 | - | 436 | 8.1 | 801 | 0.545 | 100 | NA | NA |
| Lane 2 | 436 | - | 436 | 8.1 | 801 | 0.545 | 100 | NA | NA |
| Lane 3 | 436 | - | 436 | 8.1 | 801 | 0.545 | 100 | NA | NA |
| Lane 4 | - | 198 | 198 | 7.1 | 243[1] | 0.814 | 100 | 99.6 | 3 |
| Lane 5 | 13 | - | 13 | 100.0 | 519 | 0.025 | 100 | NA | NA |
| Approach | 1322 | 198 | 1520 | 8.7 | | 0.814 | | | |

NorthEast: William Roberts Road Extension

| Mov. From NE To Exit: | L2 SE | R2 NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 233 | - | 233 | 9.0 | 453 | 0.515 | 100 | 0.0 | 2 |
| Lane 2 | - | 137 | 137 | 6.5 | 128 | 1.075 | 100 | NA | NA |
| Approach | 233 | 137 | 371 | 8.1 | | 1.075 | | | |

NorthWest: Ti Rakau Drive (West)

| Mov. From NW To Exit: | L2 NE | T1 SE | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 368 | - | 368 | 5.7 | 335 | 1.101 | 100 | NA | NA |
| Lane 2 | - | 497 | 497 | 7.8 | 573 | 0.868 | 79[5] | NA | NA |
| Lane 3 | - | 697 | 697 | 7.8 | 803 | 0.868 | 79[5] | NA | NA |
| Lane 4 | - | 25 | 25 | 100.0 | 519 | 0.048 | 100 | NA | NA |
| Approach | 368 | 1219 | 1587 | 8.7 | | 1.101 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 3478 | 8.7 | 1.101 |

Site: 7.5 [7.5 Mattson Rd/ Ti Rakau Dr]

SouthEast: Ti Rakau Drive (East)

| Mov. From SE To Exit: | L2 SW | T1 NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 81 | 145 | 226 | 6.9 | 238 | 0.949 | 100 | 100.0 | 2 |
| Lane 2 | - | 578 | 578 | 8.0 | 610[1] | 0.949 | 100 | NA | NA |

| Mov. | | | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 3 | - | 761 | 761 | 8.0 | 802 | 0.949 | 100 | NA | NA |
| Lane 4 | - | 13 | 13 | 100.0 | 511 | 0.025 | 100 | NA | NA |
| Approach | 81 | 1497 | 1578 | 8.6 | | 0.949 | | | |

NorthWest: Ti Rakau Drive (West)

| Mov. From NW To Exit: | T1 SE | R2 SW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 164 | - | 164 | 8.0 | 802 | 0.204 | 27[6] | NA | NA |
| Lane 2 | 601 | - | 601 | 8.0 | 802 | 0.750 | 100 | NA | NA |
| Lane 3 | 601 | - | 601 | 8.0 | 802 | 0.750 | 100 | NA | NA |
| Lane 4 | - | 60 | 60 | 6.7 | 460 | 0.130 | 100 | 0.0 | 3 |
| Lane 5 | 25 | - | 25 | 100.0 | 511 | 0.049 | 100 | NA | NA |
| Approach | 1391 | 60 | 1451 | 9.5 | | 0.750 | | | |

SouthWest: Mattson Road

| Mov. From SW To Exit: | L2 NW | R2 SE | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 26 | - | 26 | 3.8 | 414 | 0.063 | 100 | NA | NA |
| Lane 2 | - | 38 | 38 | 7.9 | 127 | 0.300 | 100 | NA | NA |
| Approach | 26 | 38 | 64 | 6.3 | | 0.300 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 3093 | 9.0 | 0.949 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

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

5 Lane under-utilisation found by the program

6 Lane under-utilisation due to downstream effects

## Merge Analysis (CCG)

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Site: 7.0 [7.0 William Roberts Rd / Ti Rakau Dr] | | | | | | | | | | | |
| SouthEast Exit: Ti Rakau Drive (East) Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 4 | Merge Analysis not applied. | | | | | | | | | |
| NorthEast Exit: William Roberts Road Extension Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| NorthWest Exit: Ti Rakau Drive (West) Merge Type: **Not Applied** | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | |
| Full Length Lane | 4 | Merge Analysis not applied. | | | | | | | | | |

| Site: 7.5 [7.5 Mattson Rd/ Ti Rakau Dr] | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast Exit: Ti Rakau Drive (East)<br>Merge Type: **Priority** | | | | | | | | | | | | | |
| Exit Short Lane | 1 | 40 | 0.0 | 601 | 625 | 3.00 | 2.00 | 164 | 1154 | 0.142 | 1.1 | 1.5 |
| Merge Lane | 2 | - | 100.0 | Merge Lane is not Opposed | | | | 601 | 1800 | 0.334 | 0.0 | 0.0 |
| NorthWest Exit: Ti Rakau Drive (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 4 | Merge Analysis not applied. | | | | | | | | | | |
| SouthWest Exit: Mattson Road<br>Merge Type: **Not Applied** | | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |

# LANE SUMMARY

## Site: 8.1 [8.1 U-turn - West of Marriot Rd (Site Folder: PM)]

## Network: N101 [PM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated    Cycle Time = 40 seconds (Site Practical Cycle Time)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SouthEast: Ti Rakau Drive (East)** | | | | | | | | | | | | | | | |
| Lane 1 | 781 | 7.8 | 781 | 7.8 | 1846 | 0.423 | 100 | 0.1 | LOS A | 0.0 | 0.0 | Full | 147 | 0.0 | 0.0 |
| Lane 2 | 781 | 7.8 | 781 | 7.8 | 1846 | 0.423 | 100 | 0.1 | LOS A | 0.0 | 0.0 | Full | 147 | 0.0 | 0.0 |
| Lane 3 | 95 | 6.3 | 95 | 6.3 | 200 | 0.476 | 100 | 24.8 | LOS C | 1.7 | 12.6 | Short | 14 | 0.0 | NA |
| Lane 4 (B) | 13 | 100.0 | 13 | 100.0 | 657 | 0.020 | 100 | 0.2 | LOS A | 0.0 | 0.1 | Full | 147 | 0.0 | 0.0 |
| Approach | 1670 | 8.4 | 1670 | 8.4 | | 0.476 | | 1.5 | LOS A | 1.7 | 12.6 | | | | |
| **NorthWest: Ti Rakau Drive (West)** | | | | | | | | | | | | | | | |
| Lane 1 | 700 | 7.9 | 699 | 7.9 | 1015 | 0.689 | 100 | 7.8 | LOS A | 9.5 | 70.7 | Full | 73 | 0.0 | 12.1 |
| Lane 2 | 700 | 7.9 | 699 | 7.9 | 1015 | 0.689 | 100 | 7.8 | LOS A | 9.5 | 70.7 | Full | 73 | 0.0 | 12.1 |
| Lane 3 (B) | 25 | 100.0 | 25 | 100.0 | 657 | 0.038 | 100 | 0.2 | LOS A | 0.0 | 0.1 | Full | 73 | 0.0 | 0.0 |
| Approach | 1424 | 9.6 | 1423 N1 | 9.6 | | 0.689 | | 7.7 | LOS A | 9.5 | 70.7 | | | | |
| Intersection | 3094 | 9.0 | 3093 N1 | 9.0 | | 0.689 | | 4.3 | LOS A | 9.5 | 70.7 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

**Approach Lane Flows (veh/h)**

SouthEast: Ti Rakau Drive (East)

| Mov. From SE To Exit: | T1 NW | U SE | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 781 | - | 781 | 7.8 | 1846 | 0.423 | 100 | NA | NA |
| Lane 2 | 781 | - | 781 | 7.8 | 1846 | 0.423 | 100 | NA | NA |
| Lane 3 | - | 95 | 95 | 6.3 | 200 | 0.476 | 100 | 5.3 | 2 |
| Lane 4 | 13 | - | 13 | 100.0 | 657 | 0.020 | 100 | NA | NA |
| Approach | 1575 | 95 | 1670 | 8.4 | | 0.476 | | | |

NorthWest: Ti Rakau Drive (West)

| Mov. From NW To Exit: | T1 SE | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|
| Lane 1 | 699 | 699 | 7.9 | 1015 | 0.689 | 100 | NA | NA |
| Lane 2 | 699 | 699 | 7.9 | 1015 | 0.689 | 100 | NA | NA |
| Lane 3 | 25 | 25 | 100.0 | 657 | 0.038 | 100 | NA | NA |
| Approach | 1423 | 1423 | 9.6 | | 0.689 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 3093 | 9.0 | 0.689 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

| Merge Analysis | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Exit Lane Number | Short Lane Length | Percent Opng in Lane | Opposing Flow Rate | | Critical Gap | Follow-up Headway | Lane Flow Rate | Capacity | Deg. Satn | Min. Delay | Merge Delay |
| | | m | % | veh/h | pcu/h | sec | sec | veh/h | veh/h | v/c | sec | sec |
| SouthEast Exit: Ti Rakau Drive (East)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | | |
| NorthWest Exit: Ti Rakau Drive (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | | |

# LANE SUMMARY

## Site: 10.1 [10.1 U-turn - East of Edgewater Dr (West) (Site Folder: PM)]

## Network: N101 [PM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated    Cycle Time = 40 seconds (Site Practical Cycle Time)

**Lane Use and Performance**

| | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 85% BACK OF QUEUE [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast: Ti Rakau Drive (East) | | | | | | | | | | | | | | | |
| Lane 1 | 796 | 7.7 | 796 | 7.7 | 1016 | 0.783 | 100 | 11.0 | LOS B | 12.5 N4 | 93.5 N4 | Full | 64 | 0.0 | 50.0 |
| Lane 2 | 796 | 7.7 | 796 | 7.7 | 1016 | 0.783 | 100 | 11.0 | LOS B | 12.5 N4 | 93.5 N4 | Full | 64 | 0.0 | 50.0 |
| Lane 3 (B) | 13 | 100.0 | 13 | 100.0 | 657 | 0.020 | 100 | 0.2 | LOS A | 0.0 | 0.1 | Full | 64 | 0.0 | 0.0 |
| Approach | 1604 | 8.4 | 1604 | 8.4 | | 0.783 | | 10.9 | LOS B | 12.5 | 93.5 | | | | |
| NorthWest: Ti Rakau Drive (West) | | | | | | | | | | | | | | | |
| Lane 1 | 678 | 8.0 | 678 | 8.0 | 1844 | 0.367 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 81 | 0.0 | 0.0 |
| Lane 2 | 678 | 8.0 | 678 | 8.0 | 1844 | 0.367 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 81 | 0.0 | 0.0 |
| Lane 3 | 117 | 6.8 | 117 | 6.8 | 199 | 0.588 | 100 | 25.7 | LOS C | 2.2 | 16.2 | Short | 15 | 0.0 | NA |
| Lane 4 (B) | 25 | 100.0 | 25 | 100.0 | 657 | 0.038 | 100 | 0.2 | LOS A | 0.0 | 0.1 | Full | 81 | 0.0 | 0.0 |
| Approach | 1497 | 9.4 | 1497 | 9.4 | | 0.588 | | 2.0 | LOS A | 2.2 | 16.2 | | | | |
| Intersection | 3101 | 8.9 | 3101 | 8.9 | | 0.783 | | 6.6 | LOS A | 12.5 | 93.5 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N4 Average back of queue has been restricted to the available queue storage space.

**Approach Lane Flows (veh/h)**

SouthEast: Ti Rakau Drive (East)

| Mov. From SE To Exit: | T1 NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|
| Lane 1 | 796 | 796 | 7.7 | 1016 | 0.783 | 100 | NA | NA |
| Lane 2 | 796 | 796 | 7.7 | 1016 | 0.783 | 100 | NA | NA |
| Lane 3 | 13 | 13 | 100.0 | 657 | 0.020 | 100 | NA | NA |
| Approach | 1604 | 1604 | 8.4 | | 0.783 | | | |

NorthWest: Ti Rakau Drive (West)

| Mov. From NW To Exit: | T1 SE | U NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 678 | - | 678 | 8.0 | 1844 | 0.367 | 100 | NA | NA |
| Lane 2 | 678 | - | 678 | 8.0 | 1844 | 0.367 | 100 | NA | NA |
| Lane 3 | - | 117 | 117 | 6.8 | 199 | 0.588 | 100 | 22.0 | 2 |
| Lane 4 | 25 | - | 25 | 100.0 | 657 | 0.038 | 100 | NA | NA |
| Approach | 1380 | 117 | 1497 | 9.4 | | 0.588 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 3101 | 8.9 | 0.783 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

| Merge Analysis | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Exit Lane Number | Short Lane Length | Percent Opng in Lane | Opposing Flow Rate | | Critical Gap | Follow-up Headway | Lane Flow Rate | Capacity | Deg. Satn | Min. Delay | Merge Delay |
| | | m | % | veh/h | pcu/h | sec | sec | veh/h | veh/h | v/c | sec | sec |
| SouthEast Exit: Ti Rakau Drive (East)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | | |
| NorthWest Exit: Ti Rakau Drive (West)<br>Merge Type: **Not Applied** | | | | | | | | | | | | |
| Full Length Lane | 1 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 2 | Merge Analysis not applied. | | | | | | | | | | |
| Full Length Lane | 3 | Merge Analysis not applied. | | | | | | | | | | |


Organisation: AECOM AUSTRALIA PTY LTD | Licence: NETWORK / Enterprise | Processed: Thursday, 5 May 2022 8:32:51 am
Project: C:\Users\jacques.vandenheever\Downloads\2028 Final PM.sip9

# Appendix L

Base 2018 Model Update Report

# Eastern Busway - Base 2018 Model Update Report

Prepared for Auckland Transport (AT)
Prepared by Beca Limited

**28 February 2019**

# Contents

# Appendices



# List of Abbreviations

| Abbreviation | |
|---|---|
| ADTA | Auckland Dynamic Traffic Assignment (model) |
| AFC | Auckland Forecasting Centre |
| AMETI | Auckland-Manuka Eastern Transport Initiative |
| AT | Auckland Transport |
| GEH | Gesellschaft zur Erhaltung alter und gefährdeter Haustierrassen (statistic) |
| JDF | Junction Delay Function |
| MSM | Macro Strategic Model |
| NZTA | New Zealand Transport Agency |
| QLD | Queensland model (Aimsun model in Australia) |
| SCATS | Sydney Coordinated Adaptive Traffic System |
| TPF | Turn Delay Function |
| VDF | Volume Delay Function |
| EB | Eastern Busway |

# Table of Figures

# Table of Tables

## Revision History

| Revision Nº | Prepared By | Description | Date |
|---|---|---|---|
| 1.0 | **Ling Hoong** | Draft for client comments | 1 March 2019 |
| | | | |
| | | | |
| | | | |
| | | | |

## Document Acceptance

| Action | Name | Signed | Date |
|---|---|---|---|
| Prepared by | **Ling Hoong** | | 1 March 2019 |
| Reviewed by | **Caleb Deverell / Nyan Aung Lin** | | 1 March 2019 |
| Approved by | **Andrew Murray** | | 1 March 2019 |
| on behalf of | Beca Limited | | |

# Executive Summary

This report details the update and calibration/validation of the Aimsun model for the Eastern Busway Project. The purpose of this model is to provide a consistent and common base for project developments in the East Auckland Area, primarily along Ti Rakau Drive for the EB 2 and EB3 detailed design work.

The model covers two three-hour peak periods (6.30 am – 9.30 am, and 3.30 pm – 6.30 pm). The modelled periods were chosen to capture the congestion typically experienced in the modelled area.

The model consists of macro and micro tiers with the respective assignment methods: static assignment and microscopic dynamic assignment (DTA). The macro tier provides an interim stage to calibrate the demand through demand adjustment and to generate 80% of paths for the micro DTA. Based on previous modelling of the area, an 80-to-20 split in static versus dynamic path assignment was considered appropriate. This gave better control of modelling route choice in the area and sense-checks during the model development process showed that route distribution in the model is reasonable.

Various observed data were provided by Auckland Transport (AT) for the model development. These included traffic counts, travel time, public transport timing, and signal timing.

The traffic demands come from the AMETI EMME traffic model and were processed before assigning to the Aimsun model. This demand interface process includes a minor refinement of AMETI traffic model zones and application of 2-to-3 hour expansion factors to fit the Aimsun model period. Demand adjustment as part of the validation process was done manually.

The model network was developed in line with the Auckland Dynamic Traffic Assignment Model (ADTA) network coding guideline, which sets out the recommended network coding methodology for Aimsun models in Auckland. This included a standard system of classification and labelling of different turn movement types which were important function variables in the ADTA-developed cost functions also adopted in this model for calculating junction and turn delays.

Model validation showed that the model meets the validation target criteria for Category C: Urban Area in NZTA Model Development Guidelines on individual link flows and turn flows for each hour between 7am – 9am, and 4pm – 6pm. Travel times in the model fit reasonably well with the observed.

Overall, the base year model is considered acceptably calibrated and validated for the purposes of the EB2/3 design work.

# 1 Introduction

## 1.1 Background

This report documents the calibration and validation of the Aimsun model to the year 2018.

The Eastern Busway project is focused on developing an integrated multi-modal transport system that supports population and economic growth in East Auckland and Manukau. This involves providing more and better transport choices and aims to significantly enhance the safety, quality and attractiveness of passenger transport, walking and cycling environments.

Beca Ltd (Beca) was commissioned by the Auckland Transport (AT) to update the existing microsimulation model in Aimsun software for testing scenarios relating to the Eastern Busway project. Figure 1 shows the extent of the model. The model was calibrated to 2018 observations and will be used to forecast operational performance for various future scenarios in 2026.

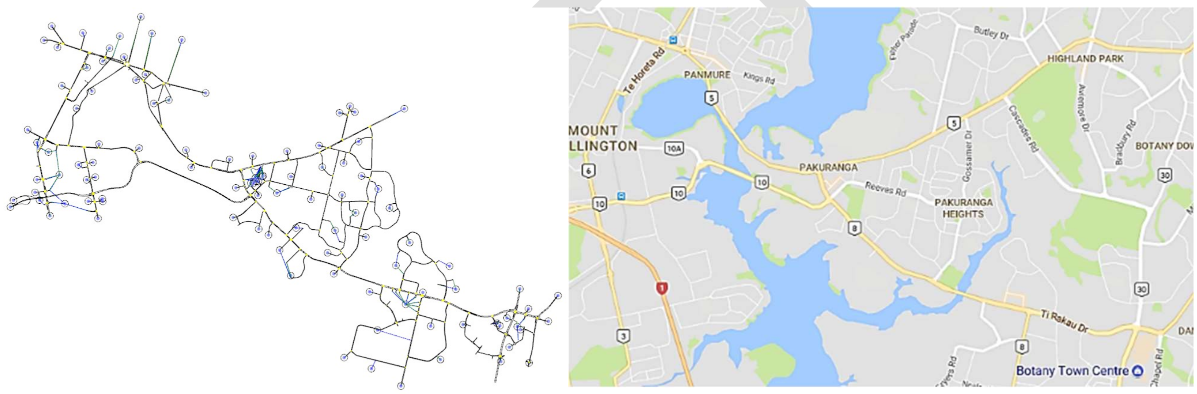



Figure 1 - Snapshot of Aimsun model network and zone structure

## 1.2 Report Structure

The remainder of this report is structured as follows:

Chapter 2 Describes the model's background and structure;

Chapter 3 Details the model's data inputs;

Chapter 4 Details the model's parameter inputs;

Chapter 5 Presents the calibration and validation results;

Chapter 6 Presents conclusions of this report;

# 2 Model Background and Structure

## 2.1 Background and Focus

Previously, an update of the Base model had been undertaken in 2017, focusing on the area around the Panmure Town Centre, including the Panmure roundabout, King's Roundabout and Lagoon Drive, which were of interest for the EB1 project. SCATS and manual traffic counts and observed travel time data were used to validate the model to a 2016 base year for EB1 option-testing.

This update focuses on the EB2/3 corridor which is along Ti Rakau Drive from Pakuranga Highway to Botany (Figure 2). This base year for this model update is 2018 where 2018 input demand were sourced from the AMETI traffic model and calibration/validation process used 2018 counts and travel time information.

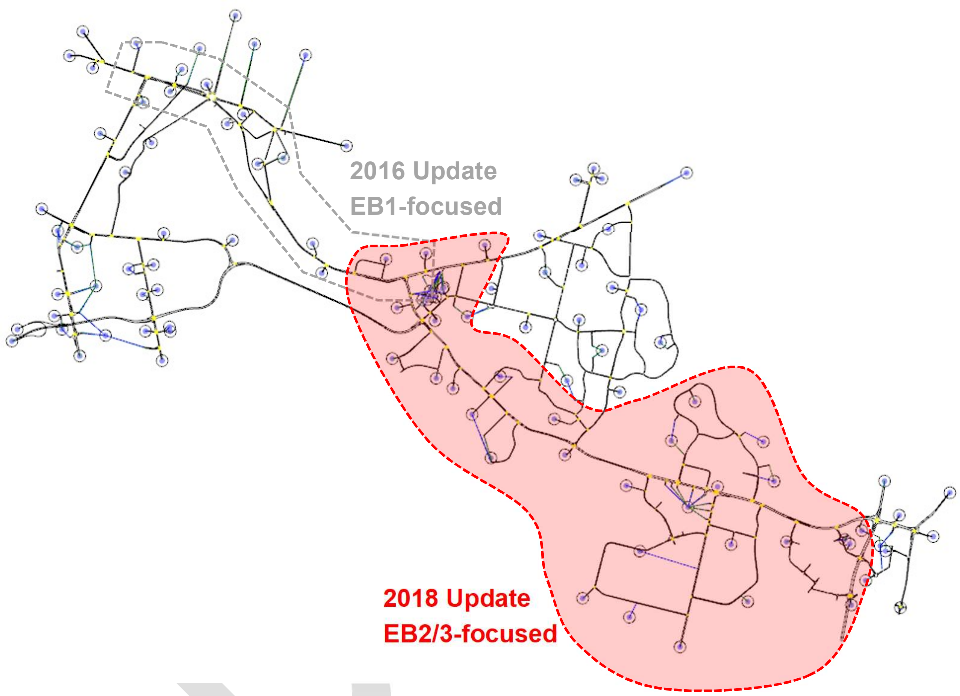



Figure 2 - Aimsun model focus areas: 2016/ EB1-focused (grey) and 2018/ EB2/3-focused (red)

## 2.2 Model Structure

The Aimsun model follows the hierarchical modelling structure that has been used successfully on other major projects in Auckland since the early 1990's. This involves the following three components:

- A strategic multi-modal **Demand (Macro Strategic Model, MSM)** model (an EMME model developed by AFC) that relates forecast land use (such as population and employment), to travel patterns at a strategic, region-wide level;
- A **Traffic Assignment** model (an EMME model developed by Arup) that has a more refined network representation for the wider study area. It takes the demand matrices from the Demand model and is calibrated to match traffic conditions particularly in the study area of interest. This model provides the cordon matrices for the Project Operational model.
- A **Project Operational** model (an Aimsun model and the focus of this report) that has a more refined network in a smaller project area. This model loads the vehicle trip patterns predicted by the assignment model onto the road network to test various options and investigate the traffic effects at a more detailed level.

It is the **project operational** model, developed in Aimsun that is detailed in this report.
The **demand** model was developed in EMME and is the Macro Strategic Model (MSM) developed by AFC. Also AMETI traffic assignment model was developed in EMME software.

The overall model structure is shown schematically in Figure 3 which comprises a hierarchical structure with the MSM model providing the multi-modal demand forecasts, and the EMME traffic assignment model and the Aimsun project model used for assignment and network performance modelling.

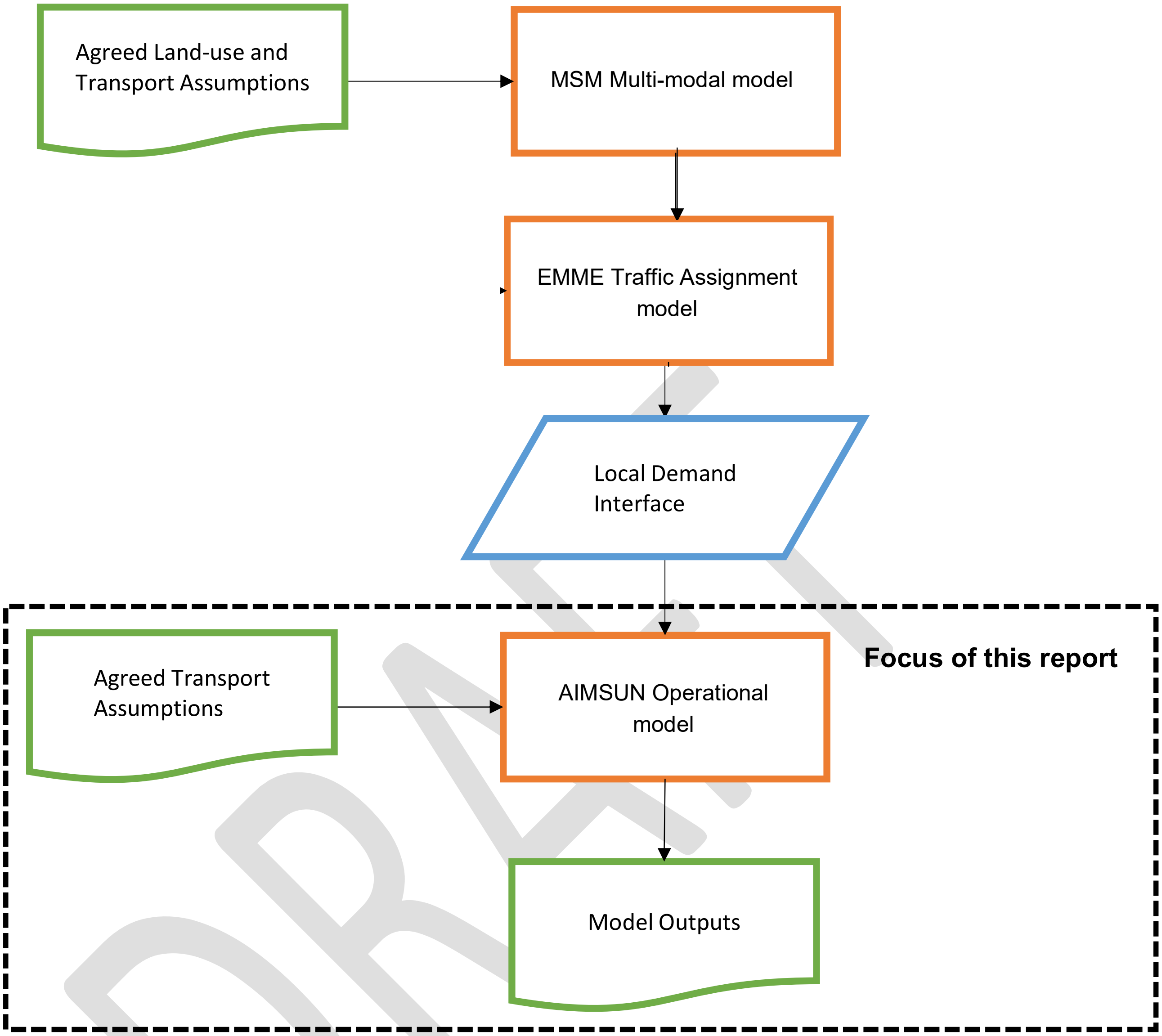



Figure 3 - Model Structure

#### 2.2.1 MSM Demand Model

The MSM model is a traditional 4-step multi-modal model.  The original model was developed for the year 2006, using the 2006 Census data and observed travel data.  The model was updated in 2017/ 2018 using Census data from 2013, and validated to 2016 conditions. Separate models exist for the morning and evening commuter peaks and weekday inter-peak periods.

The model itself comprises the following key modules:

- **Trip Generation**.  This is where the number of person-trips are estimated as a function of the land use data (population, employment, school roll etc.);
- **Mode Choice.**  This is where the choice of preferred travel mode is determined, based on the relative attractiveness of the various modes.  The key modes are car-driver, car passenger, bus passenger, train passenger and ferry passenger.  A process is used to also consider 'slow' modes, such as walking and cycling;

- **Trip Distribution.** This is where the trips produced in each zone (generally by the households), are matched to a preferred destination. This distribution is predicted as a function of the relative attractiveness of each destination zone (generally related to employment), and the travel costs to reach each destination;
- **Time of Day.** This is where the proportion of daily trips occur in each peak. The proportion occurring in each peak changes in future-year models in response to the changes in travel time and costs; and
- **Trip Assignment**. This is where the resulting travel demands, in the form of origin to destination trip tables, are loaded to the road and public transport networks. An iterative process is used to firstly identify the lowest-cost route between each origin and destination, followed by an estimation of the speeds and delays on each route associated with the predicted traffic flows on the route.

The MSM model is operated by AFC and is implemented in the EMME software, which is a well-used and proven platform for this kind of analysis.

It is therefore the MSM model that predicts the overall regional traffic patterns, based on the inputs and forecasts of population and employment growth, together with the assumed level of road and public transport infrastructure.

The MSM standard model years are 2016, 2026 and so on. To get the 2018 regional demand, a demand interpolation process was undertaken between 2016 and 2026 scenarios. The 2016 scenario is the validated MSM base year scenario. As part of this project, a 2026 scenario was developed using the today network layout and bus service patterns.

### 2.2.2 EMME Traffic Assignment Model

This model was originally developed by Arup in 2010 and was peer-reviewed. This peer-reviewed model was used as the traffic assignment model for the previous AMETI project. The model takes its traffic demands from the MSM model and has the same model extent as MSM but has a more refined network representation in the wider study area of interest (Manukau and Auckland City areas). A zone refinement process was undertaken as an interface between the MSM and traffic assignment models.

### 2.2.3 Aimsun Operational Model

The Aimsun model is only a traffic operational model in that it takes the localised traffic demands from the EMME traffic assignment model, assigns them to the road network and tests the operation of the network. Land use data is not directly used in this part of the model, and it only considers vehicle traffic i.e. it represents bus vehicles but not passengers.

## 2.3 Model Time Period

The Aimsun model models two peak periods:

- AM: 6.30am – 9.30am
- PM: 3.30pm – 6.30pm

The traffic counts and typical traffic conditions were evaluated to determine that these time periods are suitable to capture the peak traffic on the network and ending at a time when traffic cooldown is typically observed. Each peak consists of a 15 minute warm-up prior to the peak start time in order to generate an appropriate level of demand inside the network before the official start of the peak.

# 3 Model Data Inputs

## 3.1 Network

Most of the road network was formed from the previous version of the Aimsun model (updated for 2016 base year). Additional road network was added in around Cryers Road and Burswood Road in the South East area of the model. Further refinements or error-checking over the whole model were conducted based on ADTA network coding conventions (Ref. 160520_DTA_Template_JMAC_v2.1.3). Network parameters are detailed in Chapter 4.1.

## 3.2 Demand

The initial demand was from the AMETI assignment model (refer to Chapter 2.2.2) and restructured to match the zone structure in the Aimsun model.

### 3.2.1 Demand Expansion

The two-hour to three-hour demand expansion factor for each peak was 1.38. This has been applied to the two-hour EMME demands to create a three-hour demand as a starting point for model calibration/validation.

### 3.2.2 Zone Disaggregation

As discussed earlier, most of the zone refinement was undertaken between the MSM and AMETI traffic assignment models. Only a very limited zone was further refined in the demand interface process between the AMETI traffic and Aimsun models. This process was retained from the previous base model 2016. A zone to zone correlation table is provided in Appendix A.

### 3.2.3 Demand Release Profiles

For developing traffic release profiles, the zones in the Aimsun model were grouped into six sectors: Panmure, West, Internal, North, East and South (Figure 4). Within the Internal sector, a subset of zones was created to separately represent the region nearest the Panmure Bridge and assigned its own demand profile.

Figure 5 and Figure 6 show the sector-to-sector profiles applied in the Aimsun model. Traffic count profiles at key locations on the network were used as a guideline to develop these demand profiles.

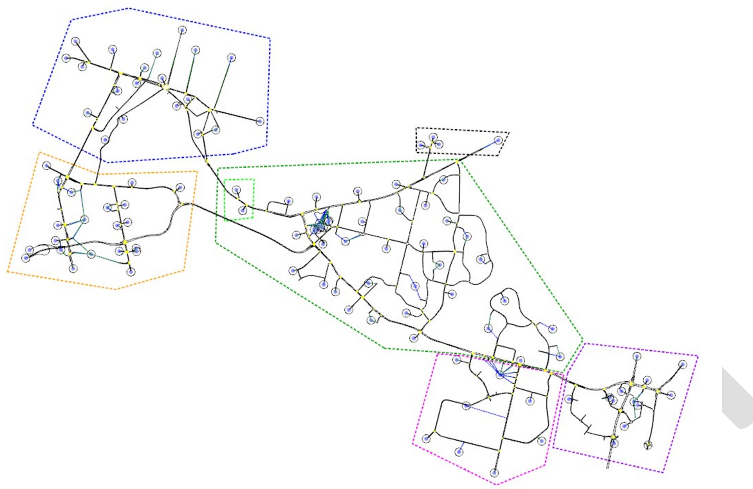


Figure 4 - Aimsun model sectors: Panmure (blue), West (yellow), Internal (dark green) with Panmure Bridge subset (light green), North (black), South (Pink), and East (purple)

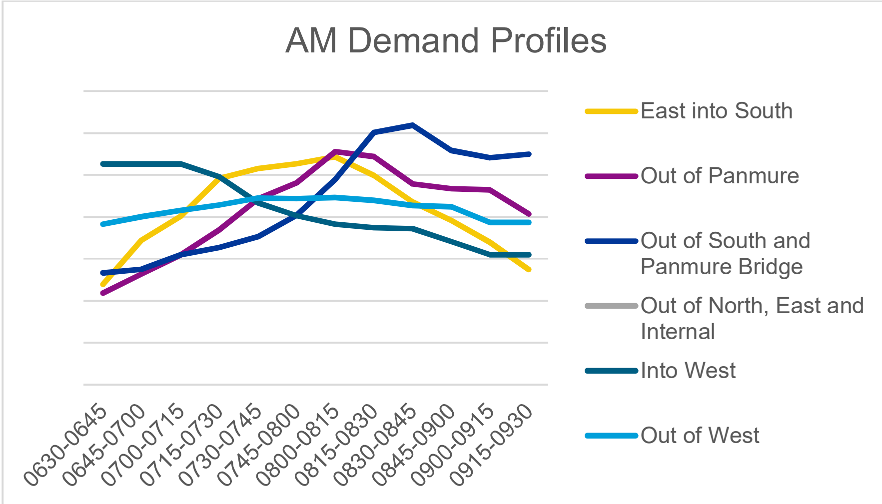



Figure 5 - AM Demand Profiles

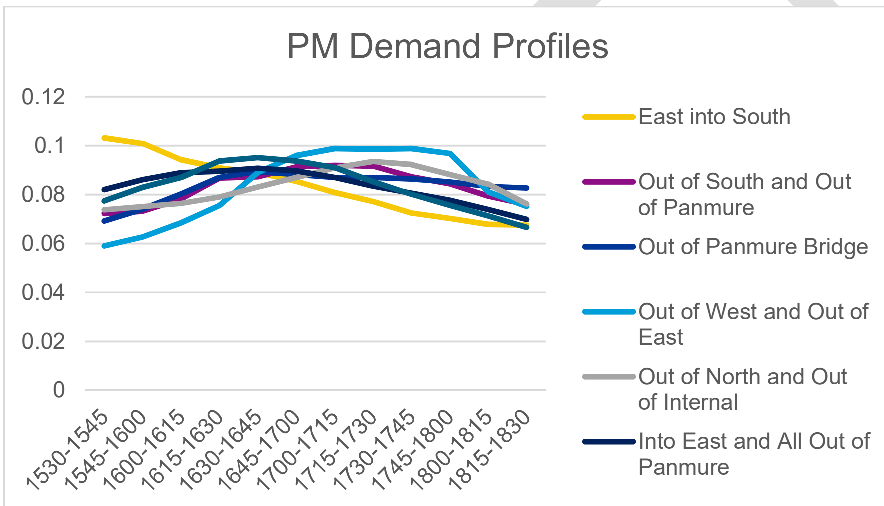



Figure 6 - PM Demand Profiles

## 3.3 Count Data

All count data for 2018 were provided by AFC, including SCATS detector counts and some manual counts. The locations of these counts used for link validation and turn validation (refer to Chapter 5) are shown in Figure 7 and Figure 8 respectively.

Link validation data was based on the average SCATS data of Tuesdays to Thursdays in March 2018. Turn validation data was based on the average of manual counts taken between Tuesday 12 June 2018 to Thursday 14 June 2018.

A sense-check of count continuity across the network was carried out and only counts that were consistent with adjacent counts were retained. This consisted of the majority of counts. All manual turn counts were checked for continuity with adjacent relevant SCATS counts and all were retained regardless of continuity since manual counts are considered more robust in general and these had been specifically provided by AFC for turn validation in the focus area. All counts used in validation were used as-is, without any further smoothing or processing.

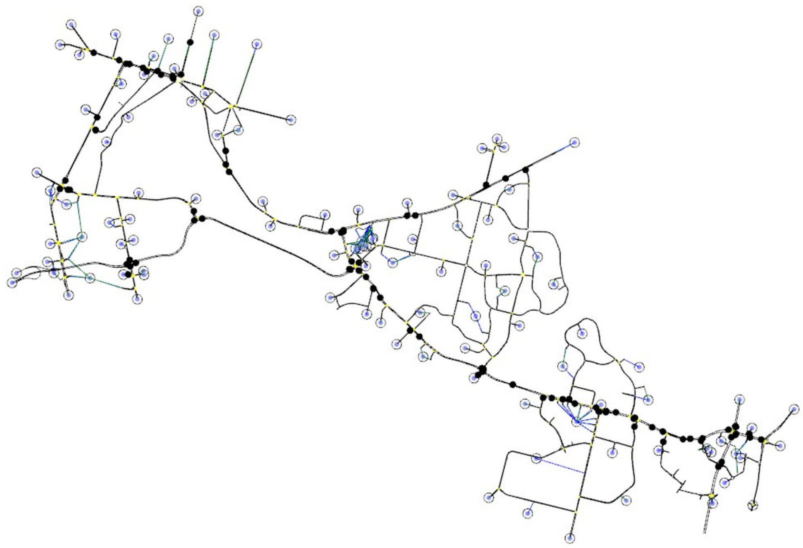


Figure 7 - Count locations used for link validation

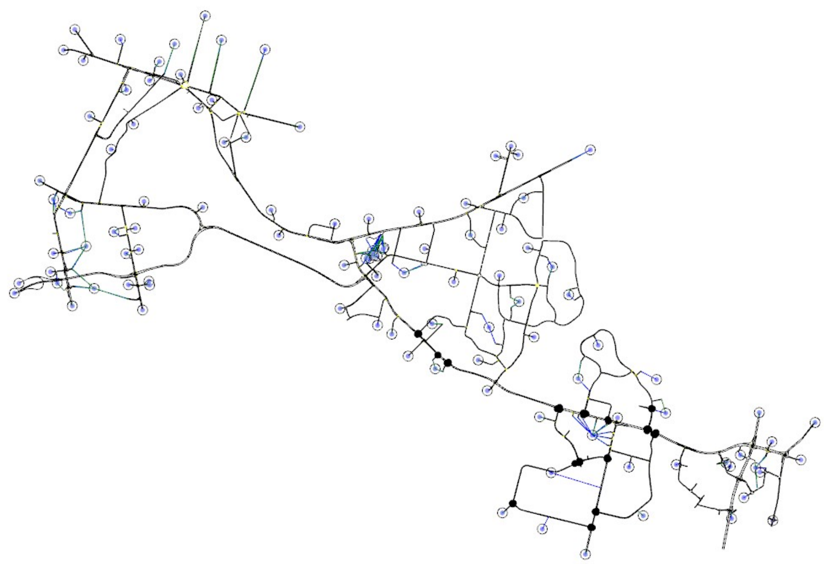


Figure 8 - Count locations used for turn validation, specifically for the model's focus area

## 3.4 Travel Time Data

The general traffic travel time data for key routes on the network (Figure 9) of Tuesdays to Thursdays in June 2018 was provided by AFC as summarised by Snitch GPS data. The full routes were provided in segments in order to understand the travel time and condition along the route. Following a sense-check of the travel times on Google, only the mean travel time on Ti Rakau Drive between Pakuranga Road and Pakuranga Highway was adjusted. All other travel times were accepted and retained for use in the validation.

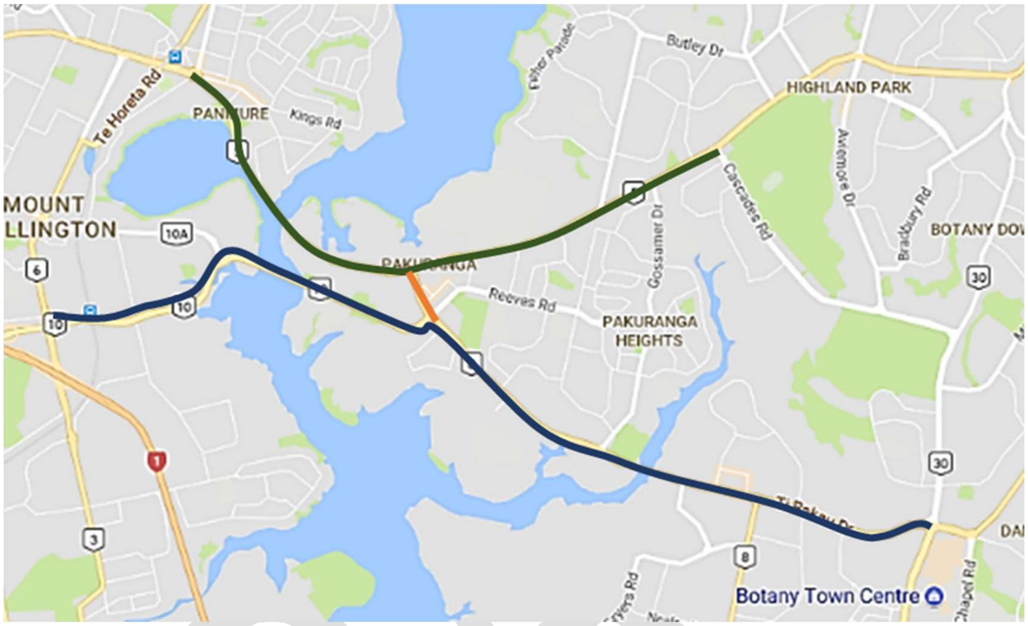



Figure 9 - Travel time routes from Snitch GPS data for reporting travel time validation in Chapter 5



## 3.5 Public Transport Data

All bus schedules and bus routes were obtained from the Auckland Transport (AT) website. Bus dwell time at bus stops were fixed at 30 sec mean stop time and deviation of 5. Bus travel time data was provided by AFC for March 2018 which included detailed timing of when each bus arrives and leaves each bus stop for each route. Following a sense-check of the travel times calculated from the raw data against AT's Journey Planner App, the average and maximum travel time of the routes were adjusted. The full list of bus services in the model is provided in Appendix D.

## 3.6 Signal Timing Data

The SCATS signal timing data of 7 March 2018 was provided by AFC for every signalised intersection within the model area. This was used to derive the signal timing coded into the model.

Average of maximum and minimum green times was used to develop the actuated control plan used in the dynamic assignment and initially used in the static assignment. During the model development process, it was noted that a fixed signal plan was more appropriate for model stability in the static assignment. Average green time from the single-day SCATS data was used as a starting point for developing the fixed control plan. Priority was placed on obtaining realistic turn delays and ensuring appropriate route choice distribution across the network rather than strict adherence to the average green times reported from that single day.

# 4 Model Parameter Inputs

## 4.1 Network Parameters

### 4.1.1 Road-Type Parameters

Road type distribution on the model network is summarised in Figure 10. Road type parameters were mostly retained from the ADTA model and provided in Appendix B. Adjustments were made to user-defined cost, third user-defined costs and capacity as part of the calibration process of route choice on the network. Lane-changing cooperation was also adjusted on certain road types to reflect the level of congestion as seen on Google's traffic view modes, and the travel time data.

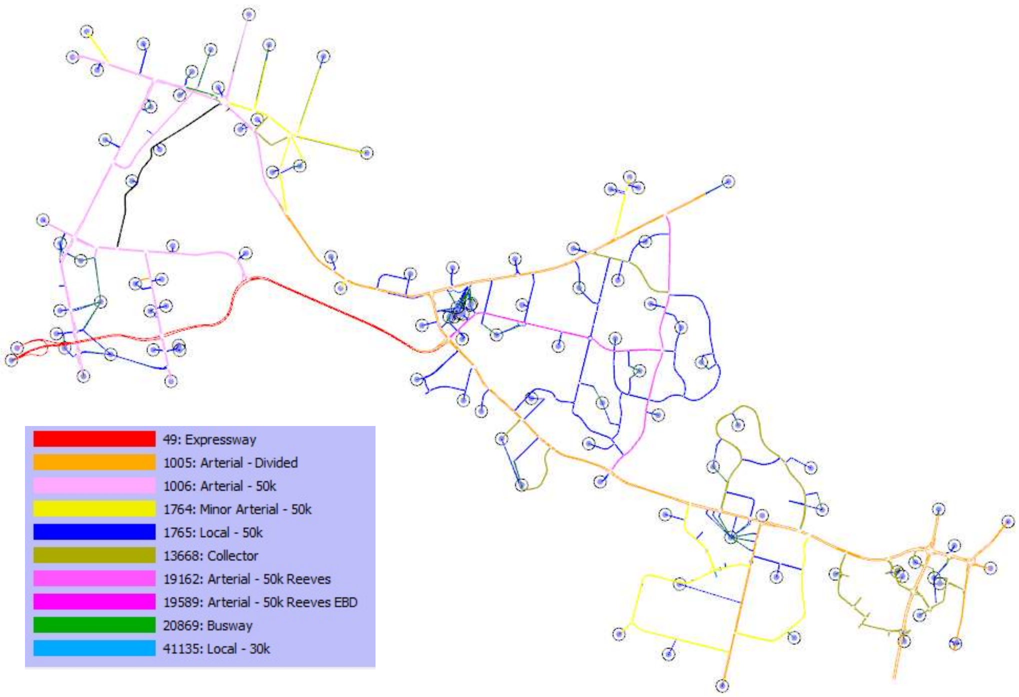



Figure 10 - Road Type Definition in the Aimsun Model

### 4.1.2 Attribute Overrides

The parameters of some sections and turns were controlled during assignment runs using Aimsun's attribute override functionality. This approach allows parameter values to be adjusted to a value more suitable than the default calculations at a particular section or turn. The parameter values that have been adjusted using attribute overrides are:

- Section maximum speed
- Turn capacity
- Turn look-ahead distance
- Lane-changing cooperation

The full list of these attribute overrides applied in the model is provided in Appendix E.

### 4.1.3 Traffic Management

Traffic management schemes on the network were applied using Aimsun's traffic management functionality. This approach also allows certain conditions of the road to be applied when they are typically observed during the modelled period and not necessarily throughout the period. Traffic management schemes in the model applied are:

- Panmure Bridge Eastbound Lane Closure: 1 Lane Closed, 6 am – 11 am
- Panmure Bridge Westbound Lane Closure: 1 Lane Closed, 3 pm – 8 pm
- Pakuranga Highway Maximum Speed Change to 55 km/h: 7.15 am – 8.45 am
- Pakuranga Highway Maximum Speed Change to 60 km/h: 4.15 pm – 6.15 pm

Ideally the speed reduction on Pakuranga Highway should be reflected by the model response, rather than the inputs. However this behaviour is hard to replicate in the model due to the unique nature of the road. For example, there is a hidden queue extended from the Pakuranga Highway and Carbine Road intersection to the Wipuna Road in the AM peak. The local drivers reduce their speeds on the bridge accordingly as they know there is a hidden queue in the downstream at the sharp corner. This traffic management inputs were not introduced in this update, they area inherited from the previous model.

## 4.2 Vehicle Parameters

Vehicle parameters were determined based on comparison and sensitivity testing with those adopted in existing Aimsun models such as ADTA (AFC), and QLD (Aecom) as well as input from the NZTA Axel Classification system. List of key vehicle parameters in the model are provided in Appendix C.

## 4.3 Cost Calculation

All functions related to calculating the cost of travel time and travel distance in the model were adopted from the ADTA model and used in the static assignment only. The travel time component consists of 1) link travel times, represented by a Volume Delay Function (VDF) on Sections, and 2) delays associated with making a turn at an intersection, represented by a Turn Penalty Function (TPF) and Junction Delay Function (JDF). Cost function scripts used in the model are provided in Appendix G.

The travel distance component reflects perceived vehicle operating costs and helps stabilise the traffic assignment.

### 4.3.1 Volume Delay Function

The VDF is based on the Akçelik VDF, which is widely adopted by strategic models in New Zealand, including MSM. Its formulation is as follows:

$$\mathbf{t = t_0 \{1 + 0.25 r_f [z + (z_2 + 8 J_A x / (Q t_0 r_f))_{0.5}]\}}$$

where:

t = average travel time per unit distance (seconds per km)

t0 = free flow travel time per unit distance (seconds per km)

$J_A$ = Akçelik friction parameter

z = x – 1

x = q / Q = degree of saturation

q = demand flow rate (pcu/hr)

Q = capacity (pcu/hr)

rf = the ratio of flow period to minimum travel time

The distance component, which is added to the travel time cost, is as follows:

**d= df x rf x L**

where:

d = the distance cost

df = distance factor (0.5 for cars and 1.0 for Trucks)

rf = road type factor

L = length of the section

This function was applied to every Section in the model, including centroid connectors. Different values of free flow speed, link capacity and Akçelik friction factors were defined by road type using Section attributes (Appendix B).

### 4.3.2 Intersection Delays – Signalised Movements

Aimsun provides default TPFs for signalised turning movements based on their respective green time split, adopting the procedures from Chapter 18 of the Highway Capacity Manual (HCM) 2010.

This procedure requires a movement capacity as an input and in the model this was estimated based on the following formula:

$$\mathbf{Q = Q_s \times l \times g / C}$$

where:

**Q** = capacity of the turning movement (pcu/hr)

**$Q_s$** = saturation flow at signal for the turning movement (pcu/hr/lane)

**l** = number of lanes for the turning movement

**g** = green time for the turning movement

**C** = cycle time at the signal

The saturation flow Qs estimation was adopted from the ADTA model and is based on the relationship between saturation flow and turning speed from simulation tests conducted in Aimsun (Figure 11).

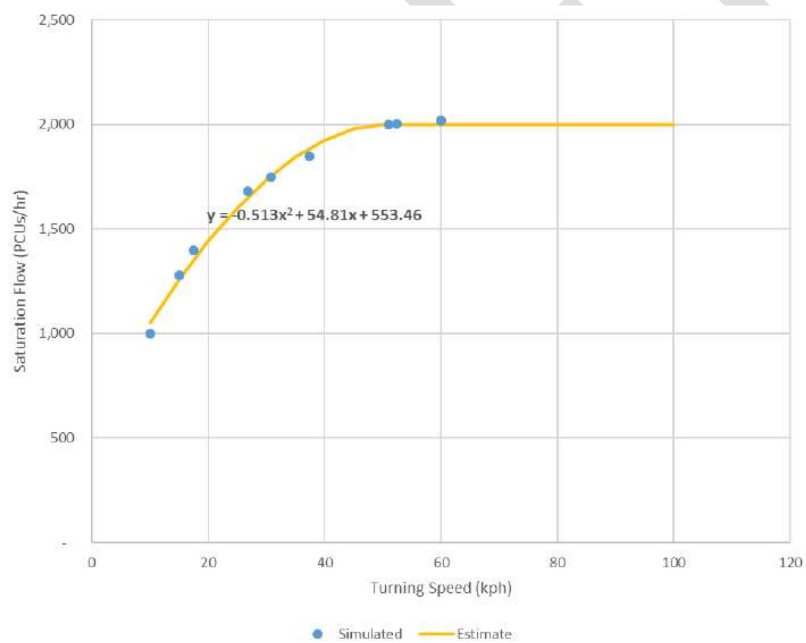



Figure 11 - Adopted Relationship between Signal Saturation Flow and Turning Speed. The line of best fit through the simulated saturation flows for turning speeds between 10 and 50 km/hr, where 10 km/hr is the minimum turning speed applied in ADTA. The saturation flow was capped at 2,000 pcu/hr/lane for turning speeds higher than 50 km/hr.

### 4.3.3 Intersection Delays – Priority Movements

Delays at priority-controlled intersections were represented by JDFs.

Relationships between the capacity of priority movements and the opposing flow were estimated using a linear relationship:

$$Q = Q_s - r \times f_o$$

where:

**Q** = capacity of the turning movement (pcu/hr)

$Q_s$ = saturation flow for the turning movement i.e. capacity of the turning movement at zero opposing flow (pcu/hr); intercept

**r** = the rate at which the capacity decreases as opposing flow increases; slope

$f_o$ = the flow opposing this turning movement (pcu/hr)

The resulting turn capacity **Q** was applied to the Akçelik VDF formula from Chapter 4.3.1 assuming a friction factor of 1.0 to calculate the corresponding turning delay for the priority movement.

The calibrated capacity intercepts and slopes for all priority turning movement types as used in the ADTA model is provided in Appendix F.

## 4.4 Model Assignment Parameters

### 4.4.1 Assignment Methodology

Based on previous modelling, an 80-to-20 split in static versus dynamic path assignment was considered appropriate for the microscopic simulation. This gave better control of modelling route choice in the area and sense-checks during the model development process showed that route distribution in the model was reasonable and supported the use of the method.

### 4.4.2 Static Assignment Parameters

Table 1 shows the key parameters of the static assignment used in the Aimsun model.

Table 1 - Key Static Assignment Parameters

| Static Assignment Parameters | |
|---|---|
| **Assignment Engine** | Frank and Wolf Assignment |
| **Maximum Iterations** | 50 |
| **Relative Gap** | 0.1 % |

### 4.4.3 Dynamic Assignment Parameters

All dynamic assignment parameters (Table 2 and Table 3) were determined based on comparison and sensitivity testing with those adopted in existing Aimsun models such as ADTA (AFC), and QLD (Aecom).



Table 2 - Key Dynamic Assignment Parameters

| Dynamic Assignment Parameters | | |
|---|---|---|
| **Main** | | |
| **Network Loading** | Microscopic Simulator | |
| **Assignment Approach** | Stochastic Route Choice | |
| **Using Warm-Up** | (5% of demand, 15 min) | |
| **Using a Saved Initial State** | No | |
| **Attributes Overrides** | (refer to Appendix E) | |
| **Performance Settings:** | | |
| **Simulation Threads** | 4 | |
| **Route Choice Threads** | 4 | |
| **Behaviour** | | |
| **Car Following:** | | |
| Two-Lane Car-Following Model | No | |
| Apply Slope Model | No | |
| Lane Changing: | | |
| Distance Zone Variability | 40% | |
| Two-Way Two-Lane Overtaking Model | No | |
| **Queue Speeds:** | | |
| Queue Entry Speed | 1 m/s | |
| Queue Exit Speed | 1 m/s | |

Table 3 - Key Dynamic Assignment Parameters continued

| Dynamic Assignment Parameters | | | | | |
|---|---|---|---|---|---|
| **Reaction Time** | | | | | |
| **Simulation Step** | 0.8 sec | | | | |
| **Reaction Time Settings** | Fixed | | | | |
| **Reaction Time at Stop** | 1.15 sec | | | | |
| **Reaction Time at Traffic Light** | 1.35 sec | | | | |
| **Arrivals** | | | | | |
| **Global Arrivals** | Normal | | | | |
| **Dynamic Traffic Assignment** | | | | | |
| **Costs:** | | | | | |
| Cycle | 5 min | | | | |
| Number of Intervals | 3 | | | | |
| Attractiveness Weight | 5 | | | | |
| User-Defined Cost Weight | 1 | | | | |
| Use Link Costs from Replication | None | | | | |
| Group Route Choice Intervals | No | | | | |
| **Fixed Routes:** | Following OD Routes | Following Input Path Assignment | | | |
| Car | 100% | 80% | | | |
| Truck | 100% | 100% | | | |
| Max. Paths to Use From Input Path Assignment | All | | | | |
| **Stochastic Route Choice:** | | | | | |
| **Model** | C-Logit | | | | |
| **Enroute** | No | | | | |
| **Enroute After Virtual Queue** | No | | | | |
| **Stochastic Route Choice - Basic:** | | | | | |
| Path Calculation | Source | Max. Number of Initial Paths to Consider | | | |
| | K-SP | 1 | | | |
| Max. Paths per Interval | For All Veh | 3 | | | |
| **Stochastic Route Choice – Parameters:** | Origin | Destination | Scale | Beta | Gamma |
| | All | All | 12 | 0.15 | 1 |

# 5 Calibration and Validation Results

## 5.1 General Approach

Calibration and validation for the model were undertaken with reference to criteria for Category C: Urban Area in NZTA Model Development Guidelines (Criteria) on individual link flows, turn flows and travel time for each hour between 7am – 9am, and 4pm – 6pm.

Adjustments to demand and network during the calibration process were carefully considered with respect to implications on model response and forecasting.
Several sense-checks were made as part of the calibration process including checks on route-choice, turn delays in the static assignment, demand profiles, HCV counts and visual congestion on the network.

## 5.2 Demand Adjustment

### 5.2.1 Manual Adjustment

All demand adjustments for the model were done manually and summarised in Table 4 - Table 9. During the demand adjustment, care was taken to retain the demand distribution from the strategic model. Adjustments were made to resolve majority of the network issues in the first instance, before demand adjustments were made.

Table 4 – AM Post-Adjusted Sector-to-Sector Demands

| | East | Internal | North | South | Panmure | West | |
|---|---|---|---|---|---|---|---|
| East | 3,465 | 1,664 | 210 | 6,545 | 940 | 2,889 | 15,713 |
| Internal | 965 | 1,101 | 1,160 | 1,922 | 1,570 | 2,769 | 9,487 |
| North | 520 | 1,301 | 0 | 860 | 4,128 | 3,451 | 10,260 |
| South | 3,716 | 1,268 | 90 | 2,865 | 374 | 499 | 8,811 |
| Panmure | 493 | 558 | 982 | 448 | 4,957 | 5,700 | 13,137 |
| West | 1,177 | 1,001 | 1,039 | 992 | 3,931 | 8,024 | 16,164 |
| | 10,336 | 6,892 | 3,481 | 13,632 | 15,900 | 23,331 | 73,572 |

Table 7 - PM Post-Adjusted Sector-to-Sector Demands

| | East | Internal | North | South | Panmure | West | |
|---|---|---|---|---|---|---|---|
| East | 4,374 | 2,299 | 916 | 3,808 | 1,104 | 1,881 | 14,382 |
| Internal | 2,293 | 1,224 | 1,867 | 1,239 | 733 | 1,431 | 8,787 |
| North | 131 | 1,582 | 0 | 169 | 1,296 | 1,319 | 4,498 |
| South | 8,000 | 2,248 | 229 | 3,166 | 873 | 793 | 15,310 |
| Panmure | 928 | 1,671 | 3,528 | 507 | 4,548 | 4,777 | 15,958 |
| West | 1,867 | 3,065 | 4,493 | 375 | 5,892 | 7,621 | 23,314 |
| | 17,592 | 12,089 | 11,033 | 9,264 | 14,447 | 17,823 | 82,249 |

Table 5 - AM Sector-to-Sector Demand Adjustment

| | **East** | **Internal** | **North** | **South** | **Panmure** | **West** | Total |
|---|---|---|---|---|---|---|---|
| **East** | -651 | -77 | -37 | 21 | 74 | 217 | -454 |
| **Internal** | -506 | -68 | 17 | -180 | -154 | 12 | -880 |
| **North** | -397 | -50 | 0 | -104 | -576 | 0 | -1,128 |
| **South** | -537 | -192 | -185 | 64 | 2 | 117 | -731 |
| **Panmure** | -99 | -85 | 230 | -417 | -1,187 | -433 | -1,991 |
| **West** | -25 | -6 | -3 | 172 | -198 | -276 | -336 |
| Total | -2,216 | -478 | 22 | -444 | -2,040 | -364 | -5,520 |

Table 8 - PM Sector-to-Sector Demand Adjustment

| | **East** | **Internal** | **North** | **South** | **Panmure** | **West** | Total |
|---|---|---|---|---|---|---|---|
| **East** | 800 | 420 | 162 | -218 | 420 | 299 | 1,882 |
| **Internal** | -216 | -21 | 566 | -348 | -131 | -36 | -185 |
| **North** | -370 | 356 | 0 | -341 | 99 | -432 | -688 |
| **South** | 11 | 378 | -471 | 599 | 134 | 126 | 778 |
| **Panmure** | -216 | 42 | 976 | -129 | -335 | 425 | 763 |
| **West** | 2 | 593 | -269 | -20 | 141 | -1,035 | -586 |
| Total | 11 | 1,768 | 964 | -456 | 329 | -653 | 1,963 |

Table 6 - AM Sector-to-Sector Demand Percent Adjustment

| | East | Internal | North | South | Panmure | West | Total |
|---|---|---|---|---|---|---|---|
| East | -16% | -4% | -15% | 0% | 8% | 8% | -3% |
| Internal | -34% | -6% | 2% | -9% | -9% | 0% | -8% |
| North | -43% | -4% | 0% | -11% | -12% | 0% | -10% |
| South | -13% | -13% | -67% | 2% | 1% | 30% | -8% |
| Panmure | -17% | -13% | 31% | -48% | -19% | -7% | -13% |
| West | -2% | -1% | 0% | 21% | -5% | -3% | -2% |
| Total | -18% | -6% | 1% | -3% | -11% | -2% | -7% |

Table 9 - PM Sector-to-Sector Demand Percent Adjustment

| | East | Internal | North | South | Panmure | West | Total |
|---|---|---|---|---|---|---|---|
| East | 22% | 22% | 21% | -5% | 61% | 19% | 15% |
| Internal | -9% | -2% | 44% | -22% | -15% | -2% | -2% |
| North | -74% | 29% | 0% | -67% | 8% | -25% | -13% |
| South | 0% | 20% | -67% | 23% | 18% | 19% | 5% |
| Panmure | -19% | 3% | 38% | -20% | -7% | 10% | 5% |
| West | 0% | 24% | -6% | -5% | 2% | -12% | -2% |
| Total | 0% | 17% | 10% | -5% | 2% | -4% | 2% |

### 5.2.2 Turn Delay Check

Turn delays from the static assignment were monitored to ensure that no major delays were adversely affecting path assignment and route distribution, as well as to gauge model stability.

To facilitate stability of the static assignment, a fixed signal control plan was used (whereas an actuated control plan was used in the dynamic assignment). Priority was placed on reducing turn delay and ensuring appropriate route choice distribution across the network rather than strict adherence to the maximum green times reported from the single-day SCATS data.

## 5.3 Static Assignment Results

### 5.3.1 Convergence

The static assignment for each modelled period was stable and attained the relative gap (rgap) before 50 iterations (Figure 12 and Figure 13). 80% of the path assignments from the static assignment was set to be retained during the dynamic assignment.

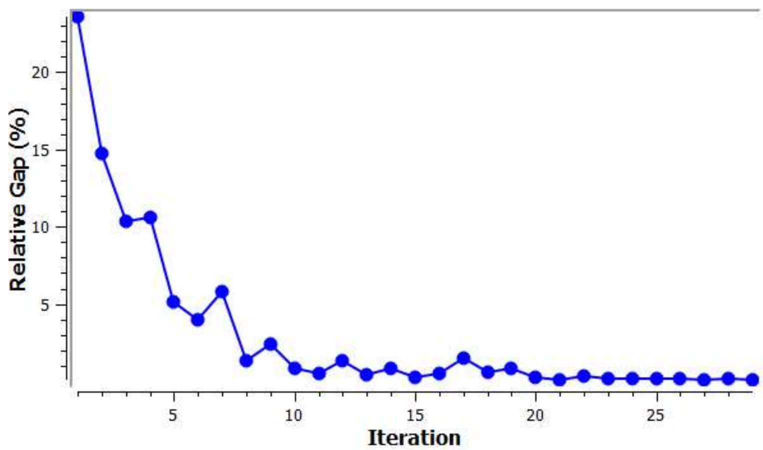



Figure 12 - AM Peak Static Assignment Convergence

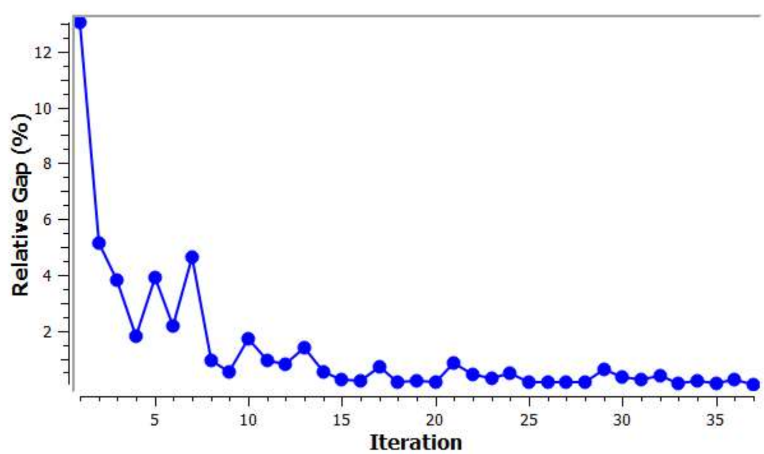



Figure 13 - PM Peak Static Assignment Convergence

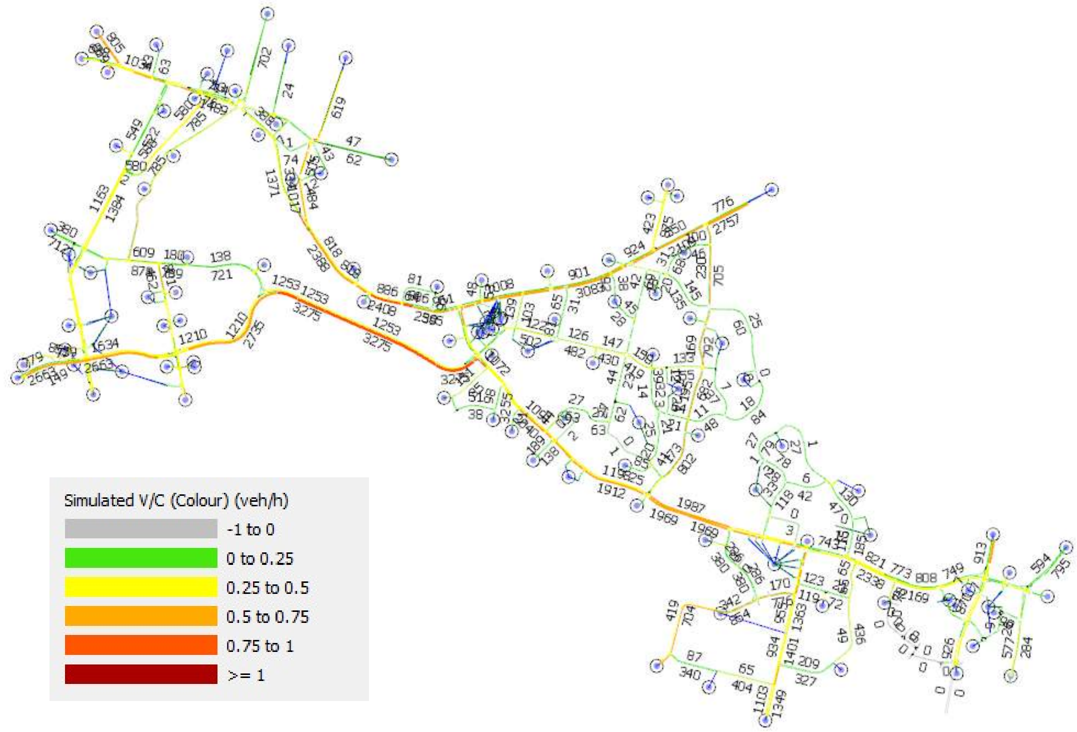



Figure 14 - AM Peak Assigned Flow in PCU/hr (6.15 am – 9.30 am)

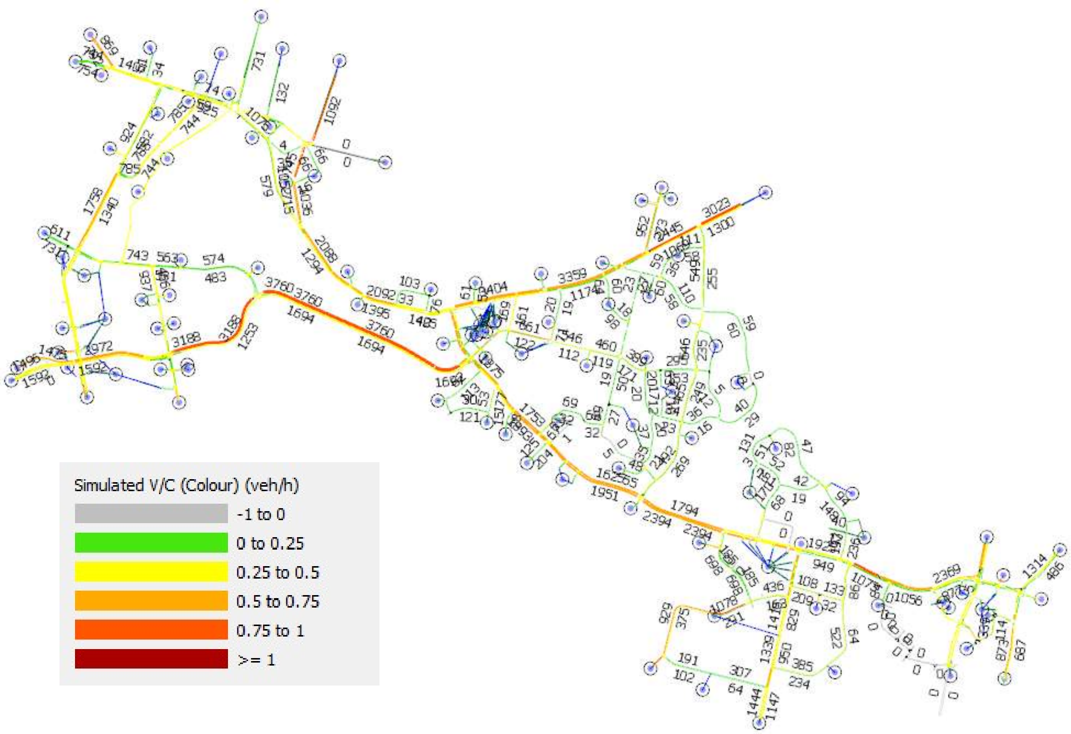



Figure 15 - PM Peak Assigned Flow in PCU/hr (3.15 pm – 6.30 pm)

## 5.4 Validation Results

### 5.4.1 Link Counts Validation

Results for individual link counts (Table 10 and Figure 16) network-wide show that the model satisfies the validation criteria for GEH, $R^2$ and RMSE.

Table 10 - Summary of Individual Link Counts Validation Results across Network

| | AM (%) | | PM (%) | | NZTA Guideline |
|---|---|---|---|---|---|
| | 7am - 8am | 8am - 9am | 4pm - 5pm | 5pm - 6pm | Category C |
| GEH <5 | 85 | 85 | 91 | 87 | >80% |
| GEH <7.5 | 94 | 95 | 98 | 99 | >85% |
| GEH <10 | 99 | 98 | 99 | 100 | >90% |
| $R^2$ | 0.98 | 0.98 | 0.99 | 0.99 | >0.95 |
| RMSE | 12 | 13 | 10 | 9 | <20% |

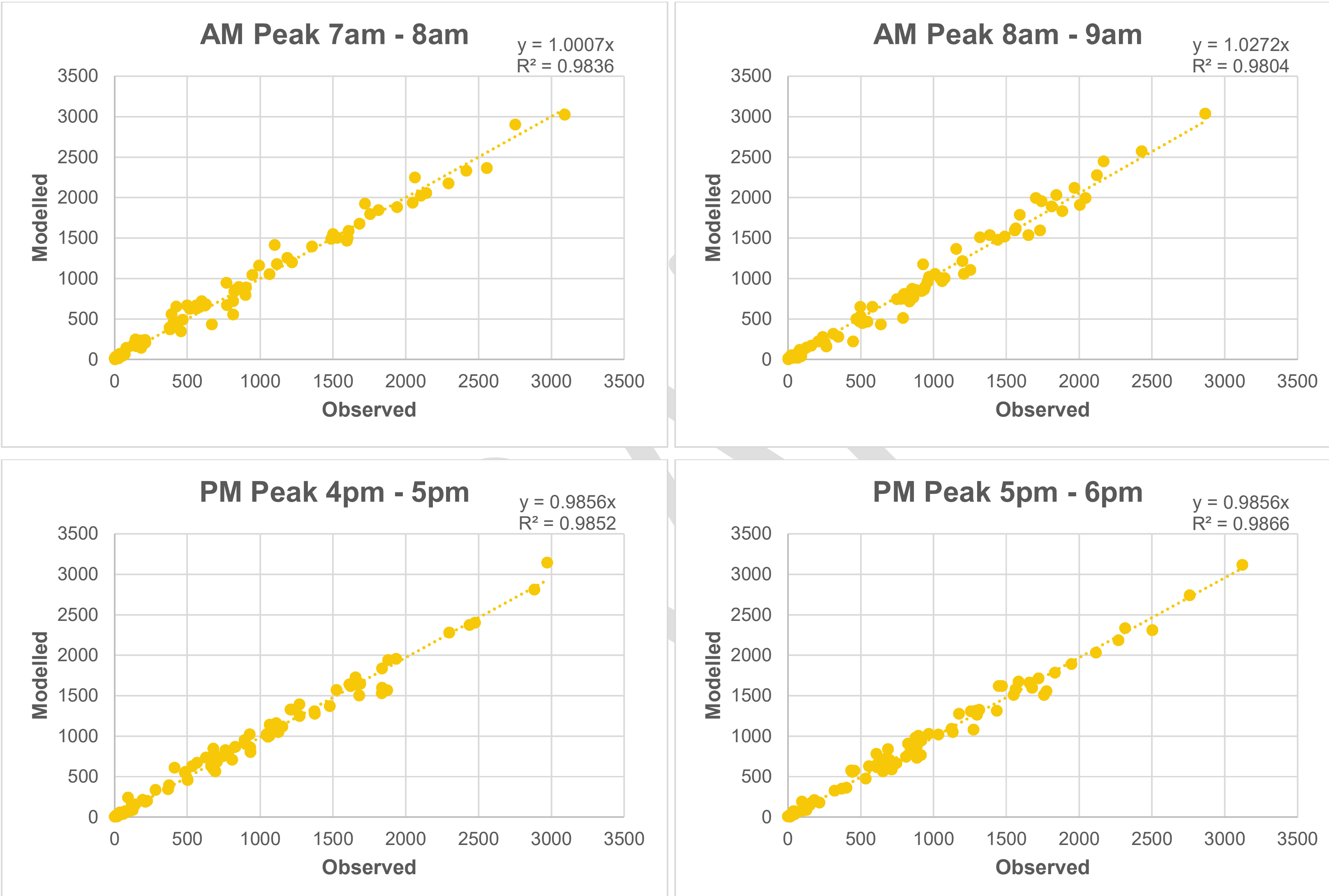



Figure 16 - Link Counts Validation Scatter Plots

### 5.4.2 Turn Counts Validation

Results for individual turn counts (Table 11) in the focus area show that the model satisfies the validation criteria for GEH, $R^2$ and RMSE. Where the modelled counts did not meet the GEH <5 criteria, the manual counts at that turn were either found to be unreasonable when cross-checked with adjacent counts or there was lack of information on reliability and therefore given less priority for validation.

Table 11 - Summary of Individual Turn Counts Validation Results in Focused Area

| | AM (%) | | PM (%) | | NZTA Guideline |
|---|---|---|---|---|---|
| | 7am - 8am | 8am - 9am | 4pm - 5pm | 5pm - 6pm | Category C |
| GEH <5 | 84 | 85 | 78 | 84 | >80% |
| GEH <7.5 | 93 | 91 | 94 | 94 | >85% |
| GEH <10 | 96 | 98 | 99 | 100 | >90% |
| $R^2$ | 0.99 | 0.98 | 0.99 | 0.99 | >0.95 |
| RMSE | 19 | 19 | 19 | 14 | <20% |

## 5.5 Flow Profile Validation

Flow profiles at key locations across the network (Figure 17) were monitored. Overall, the modelled flow profiles follow the observed profiles reasonably well (Figure 18 and Figure 19).

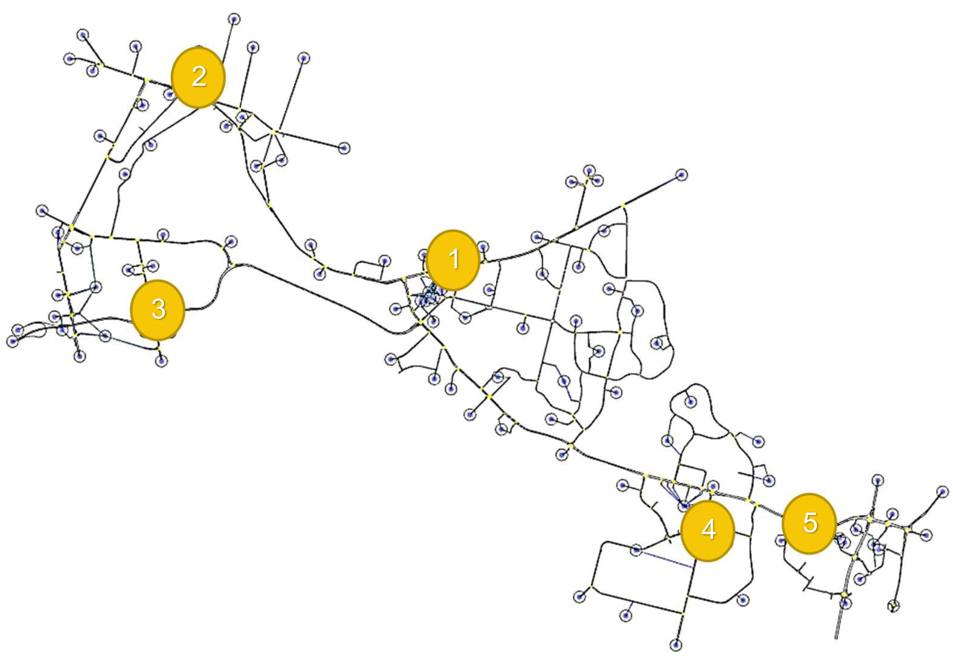
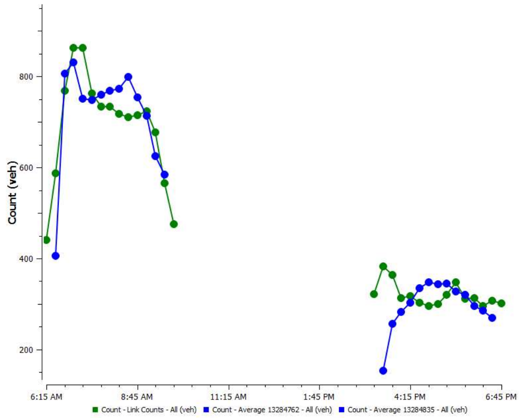



Figure 17 - Profile Validation Locations

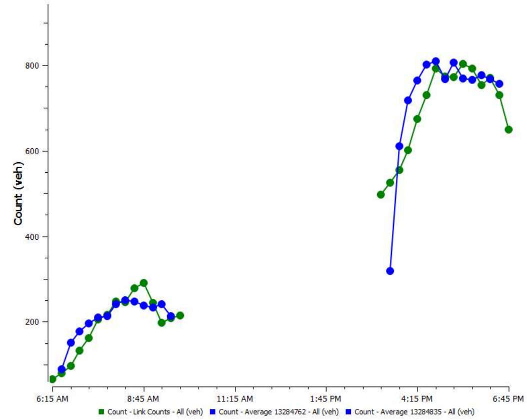
**1 – Pakuranga Road / Lewis Road**

**Westbound**



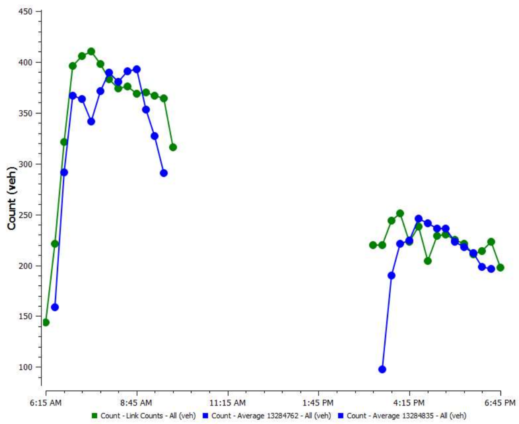

**1 – Pakuranga Road / Lewis Road**

**Eastbound**



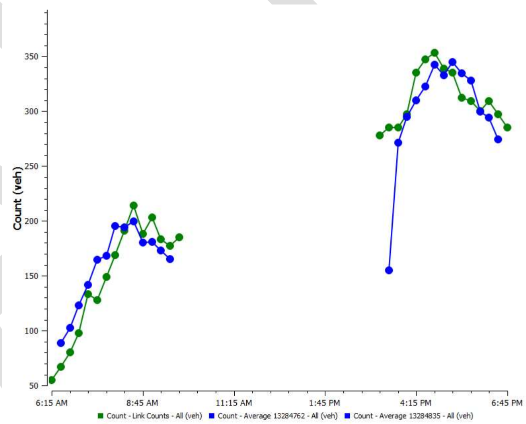

**2 – Panmure Roundabout, Mount Wellington Approach**

**Westbound**



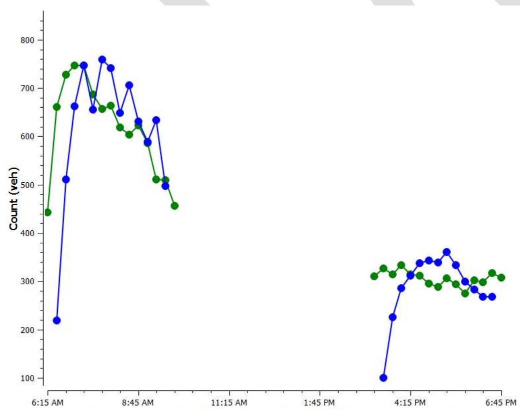

**2 – Panmure Roundabout, Mount Wellington Approach**

**Eastbound**




**3 –South-Eastern Highway / Carbine Road**

**Westbound**




**3 – South-Eastern Highway / Carbine Road**

**Eastbound**

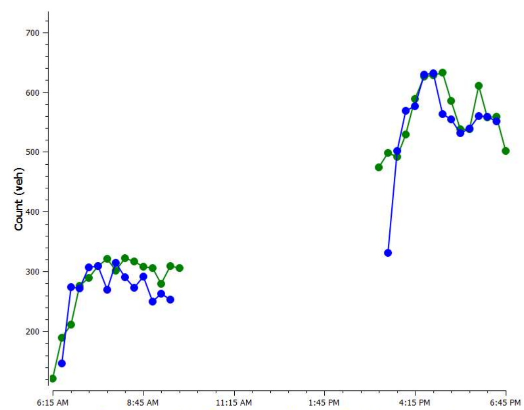
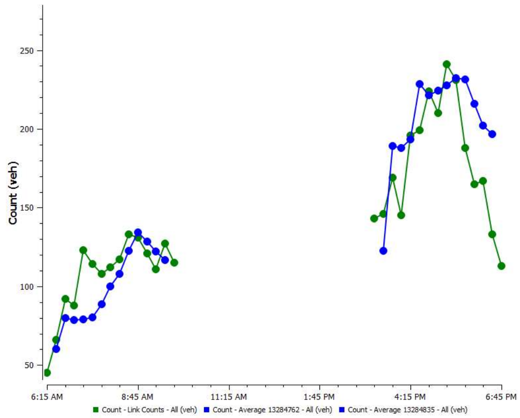



Figure 18 - Flow Profile Validation (modelled in blue, observed in green)

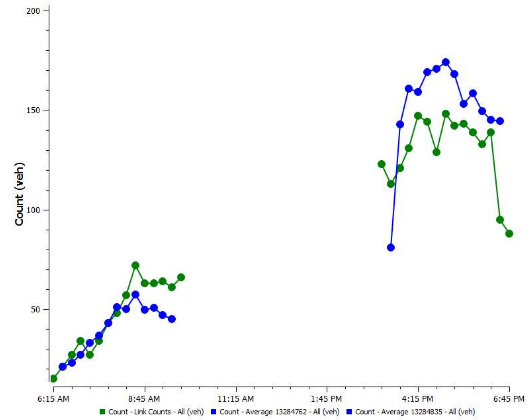
**4 –Ti Rakau Drive / Harris Road**

**Harris Road Westbound**



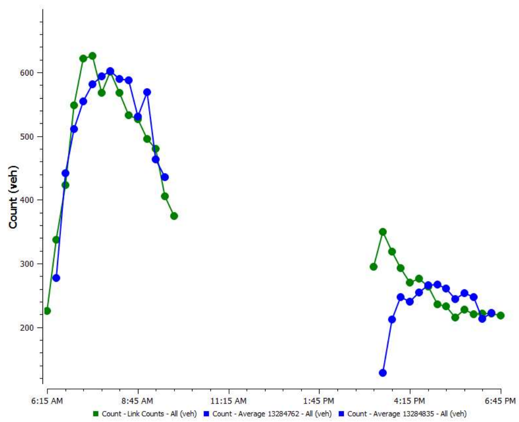

**4 –Ti Rakau Drive / Harris Road**

**Harris Road Eastbound**




**5 – Ti Rakau Drive / Huntington Drive**

**Westbound**




**5 – Ti Rakau Drive / Huntington Drive**

**Eastbound**

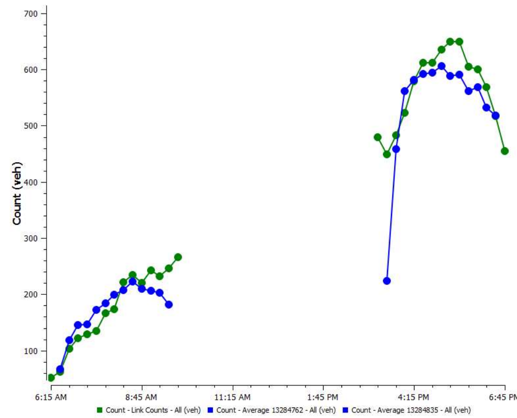



Figure 19 - Flow Profile Validation (modelled in blue, observed in green) continued

## 5.6 HCV Count Validation

A sense-check of the modelled proportion of vehicles assigned as NZTA Axel Class 4 and above (medium and heavy vehicles) was made at key locations across the network. Estimates of car to HCV proportions were made based on available tube count data and judgement. Overall, the modelled proportions match the estimates reasonably well (Figure 20).

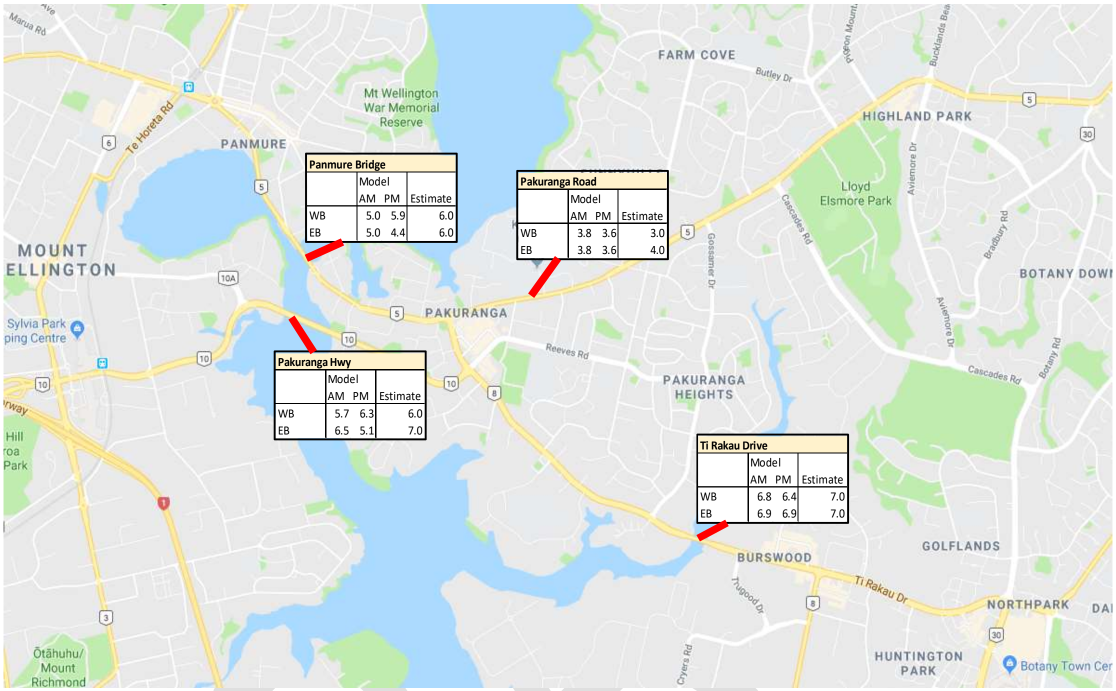



Figure 20 - Comparison of HCV percentage at key locations on the network

As described, the HCV includes MCV counts and we understand the survey at intersections only include pure HCV and hence this data was not used in this validation.

## 5.7 Travel Time Validation

Journey time versus distance graphs show that the modelled travel times were generally a good fit to the observed travel time (Figure 22 - **Error! Reference source not found.**). Signals at the modelled intersections were actuated based on minimum and maximum green times provided from the SCATS data of 7 March 2018. Adjustments were made up to five seconds above and below the maximum green time where required to calibrate travel times. Despite these adjustments, it is noted that:

- For the AM peak, modelled travel time from Edgewater Drive to Pakuranga Highway on Ti Rakau Drive is slightly low in the second hour. Overall 92% of the routes meet the Criteria for the AM peak.
- For the PM peak, modelled travel time from Jellicoe Road to Ti Rakau Drive is slightly low in the second hour. Overall 92% of the routes meet the Criteria for the PM peak.

Nevertheless, all modelled travel times (routes summarised in Figure 21) were within the 15th and 85th percentile of observed travel time. Therefore, the model is considered acceptably validated for travel time.

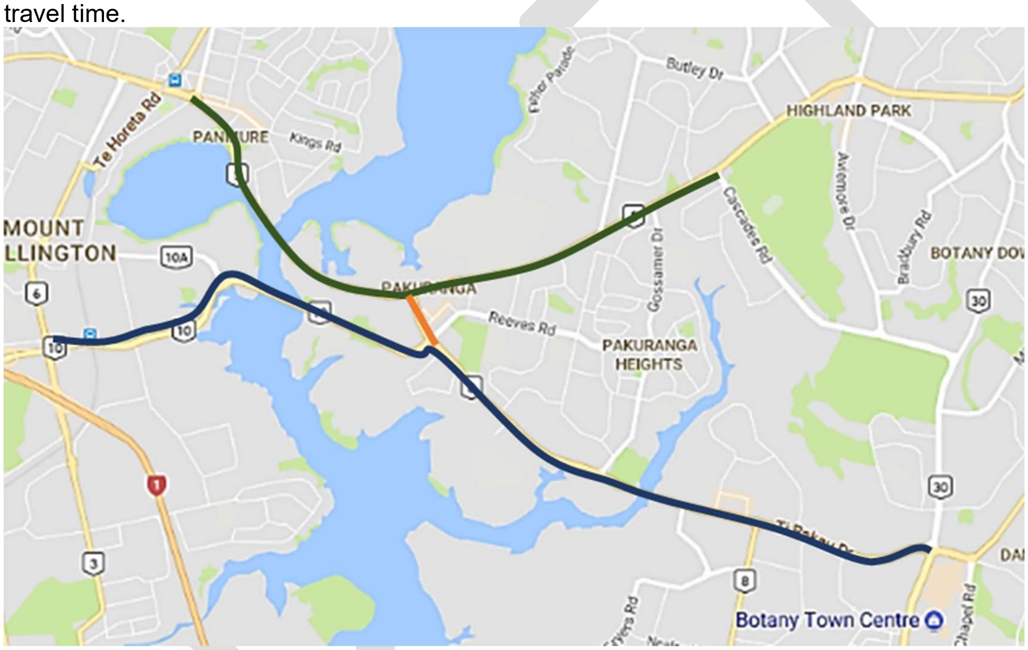



Figure 21 - Travel time routes (traffic) from Snitch GPS data for reporting travel time validation in Chapter 5

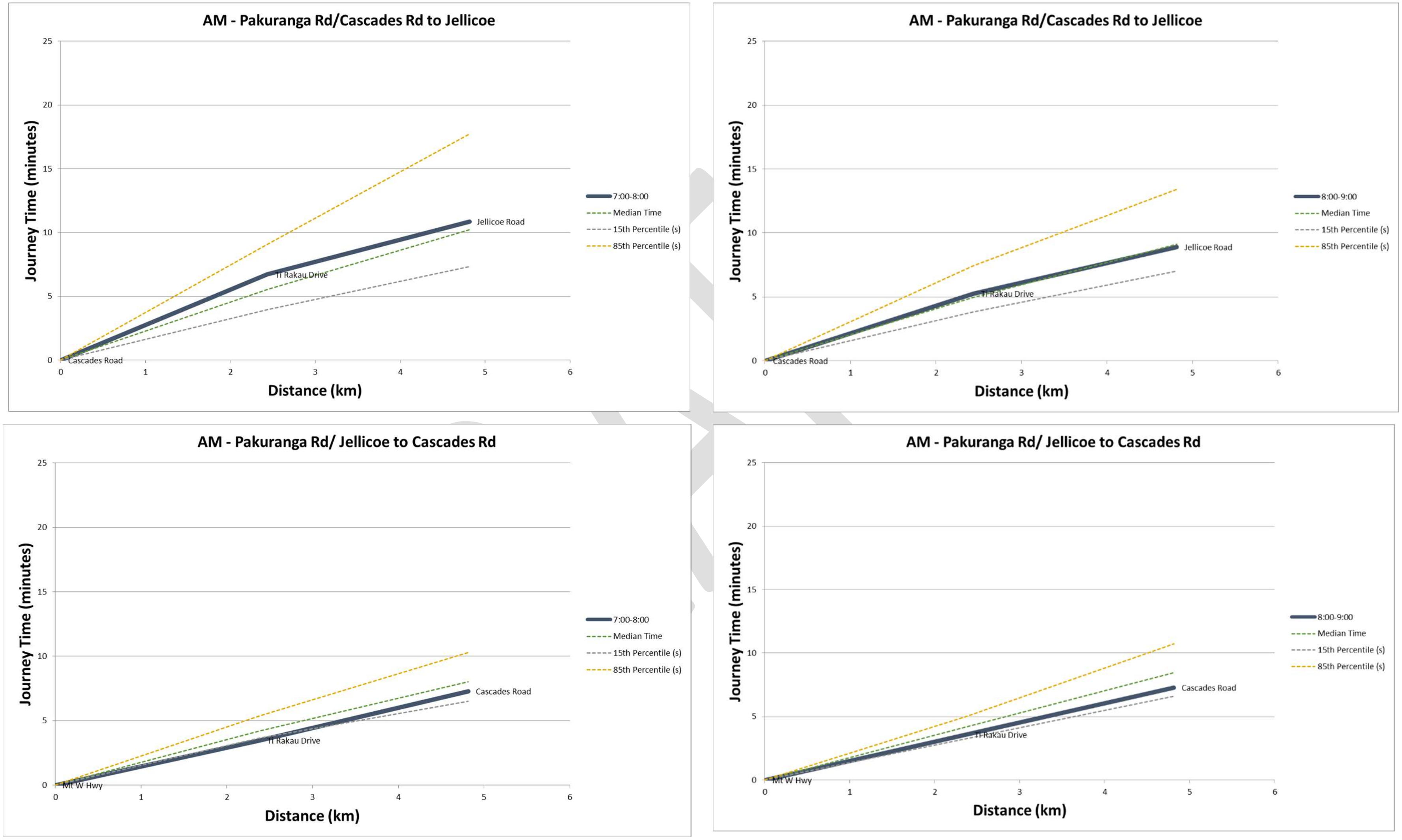



Figure 22 - Travel Time Validation Graphs: AM Pakuranga Road/ Cascades Road to Mount Wellington Highway

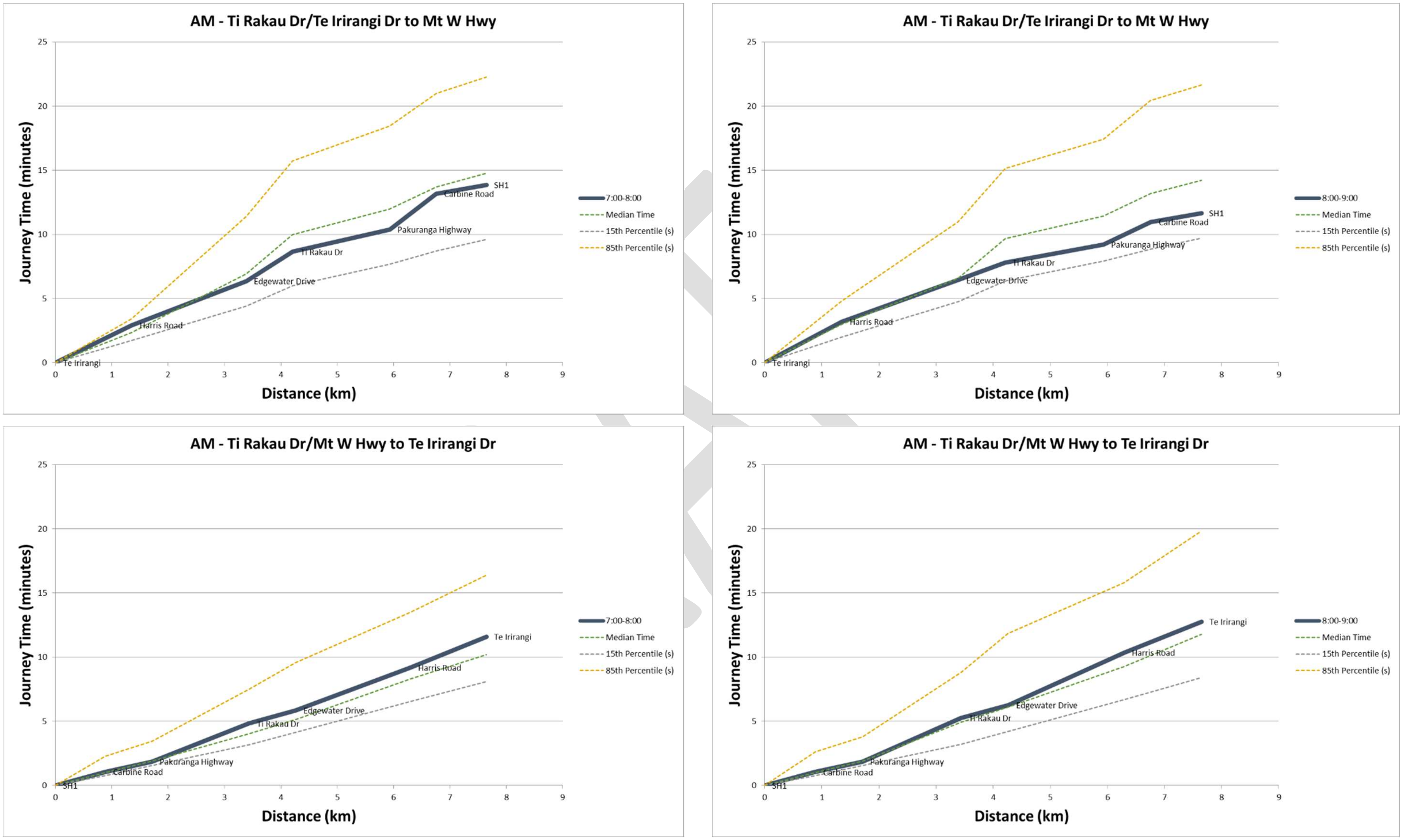



Figure 23 - Travel Time Validation Graphs: AM Ti Rakau Drive/ Te Irirangi Drive to Mount Wellington Highway

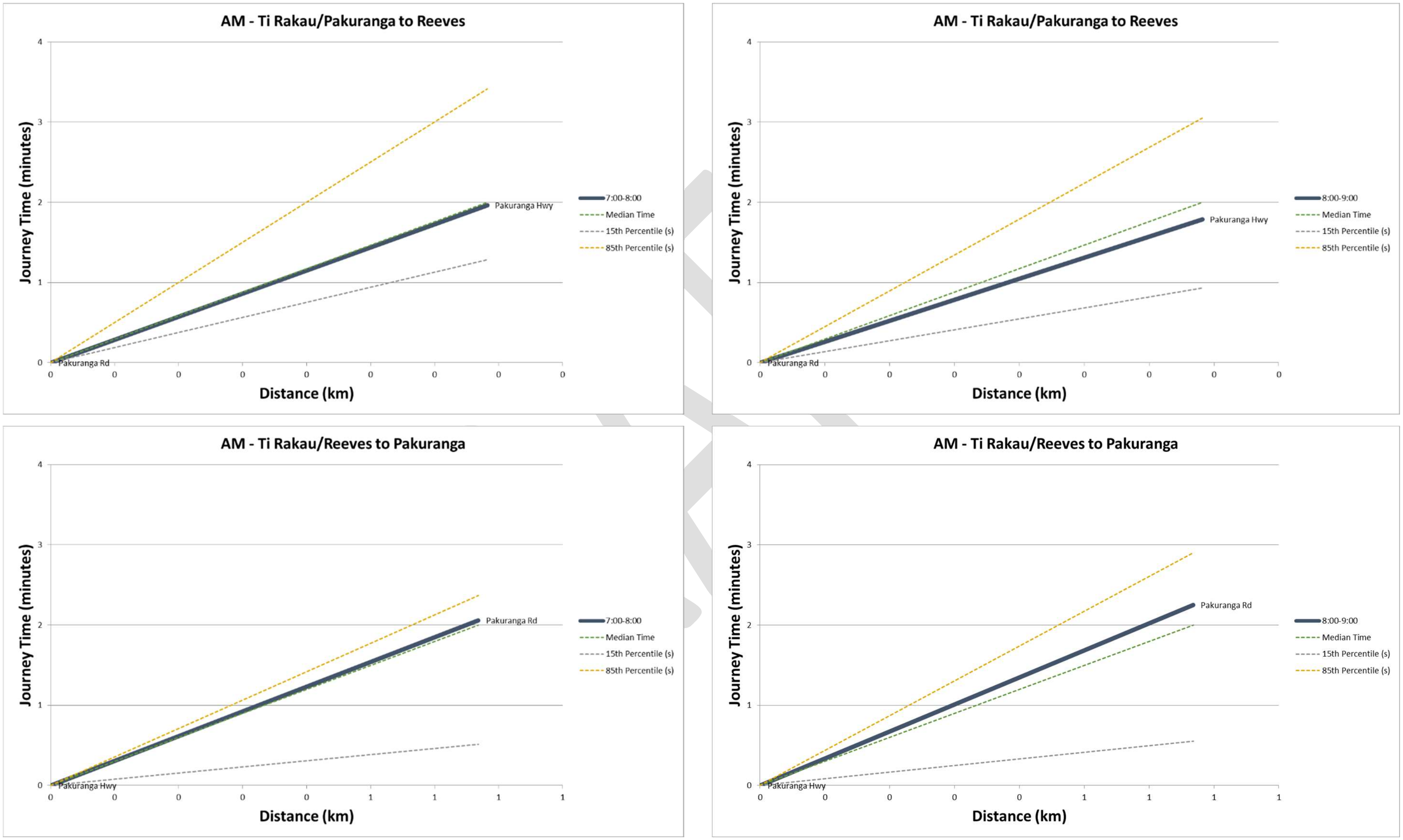



Figure 24 - Travel Time Validation Graphs: AM Ti Rakau Drive/ Pakuranga Road to Reeves Road

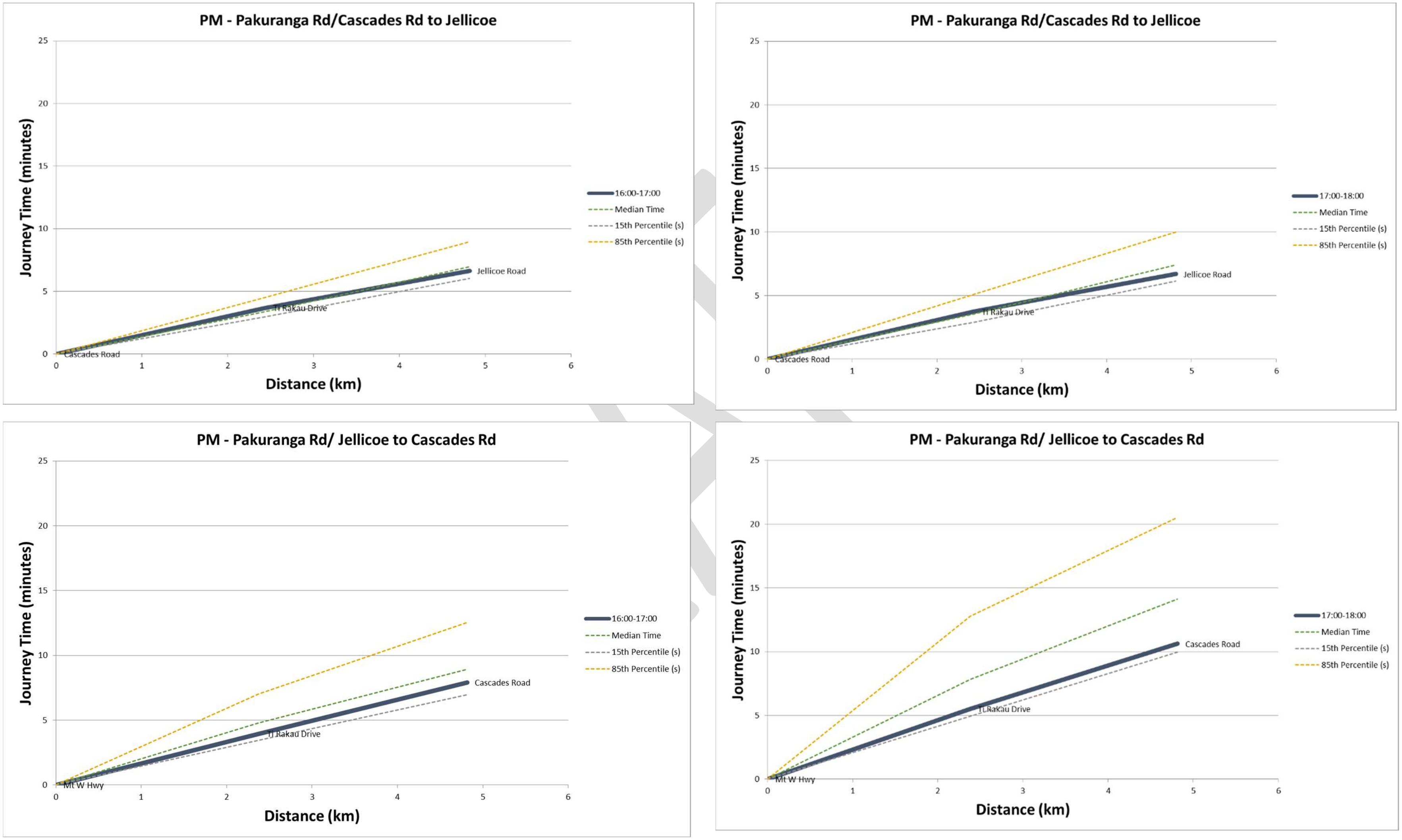



Figure 25 - Travel Time Validation Graphs: PM Pakuranga Road/ Cascades Road to Mount Wellington Highway

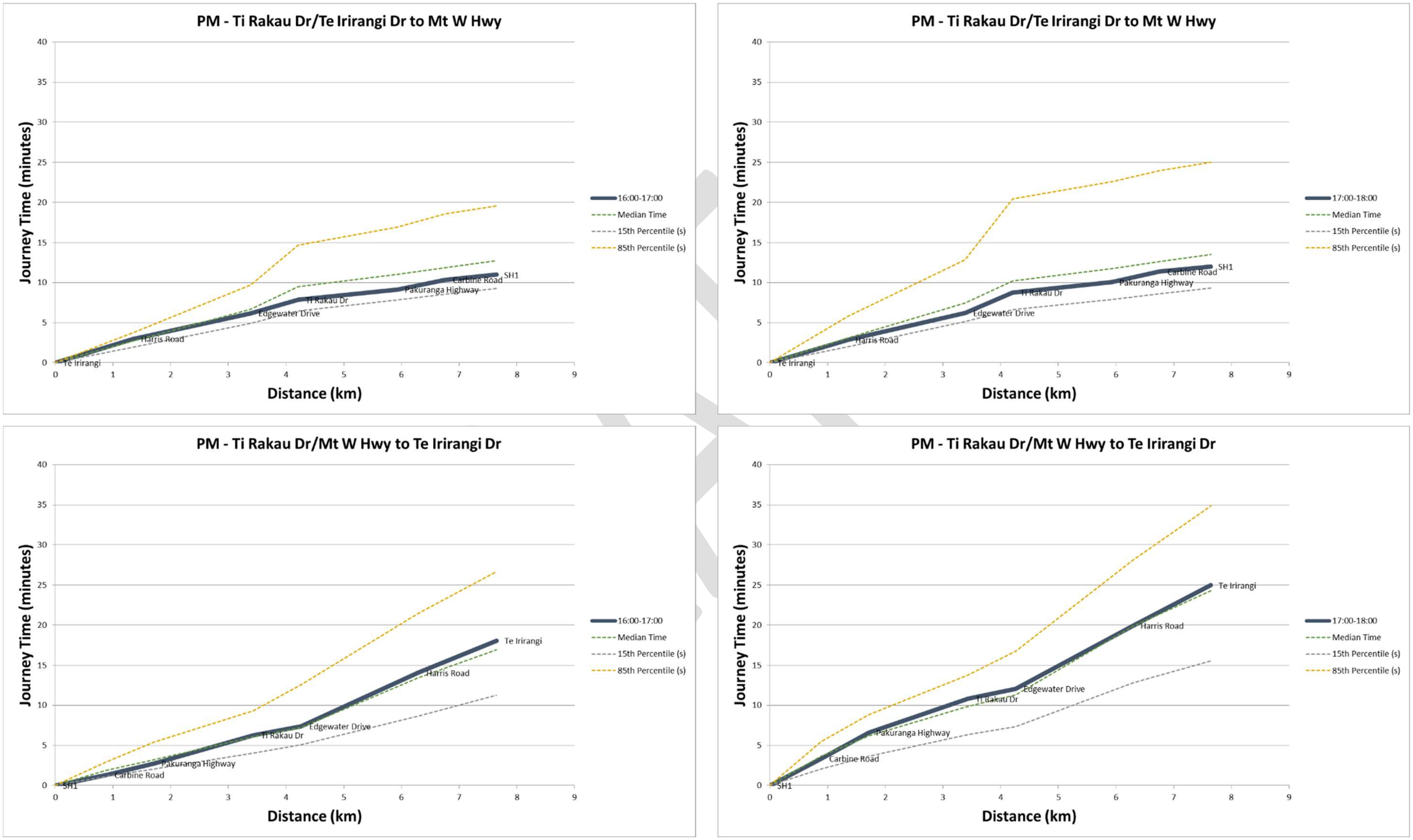



Figure 26 - Travel Time Validation Graphs: PM Ti Rakau Drive/ Te Irirangi Drive to Mount Wellington Highway

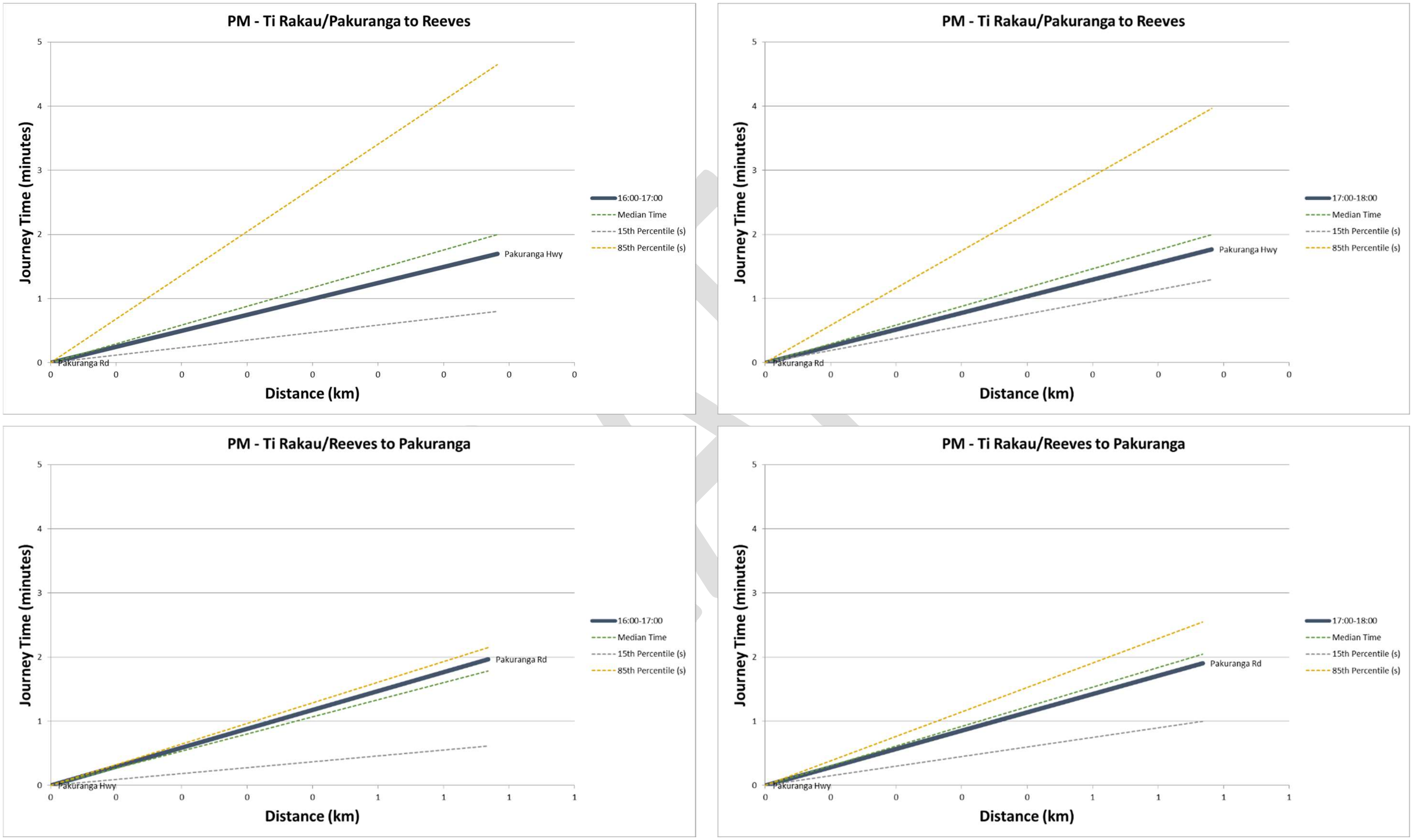


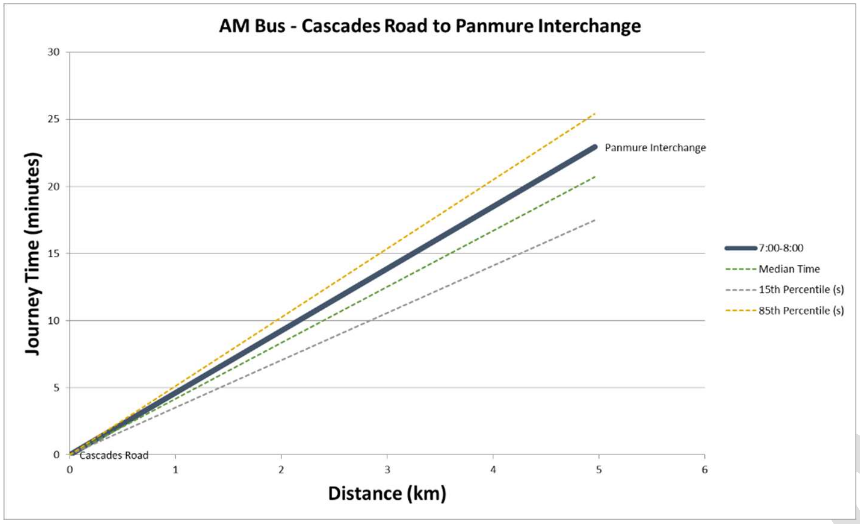

Figure 27 - Travel Time Validation Graphs: PM Ti Rakau Drive/ Pakuranga Road to Reeves Road

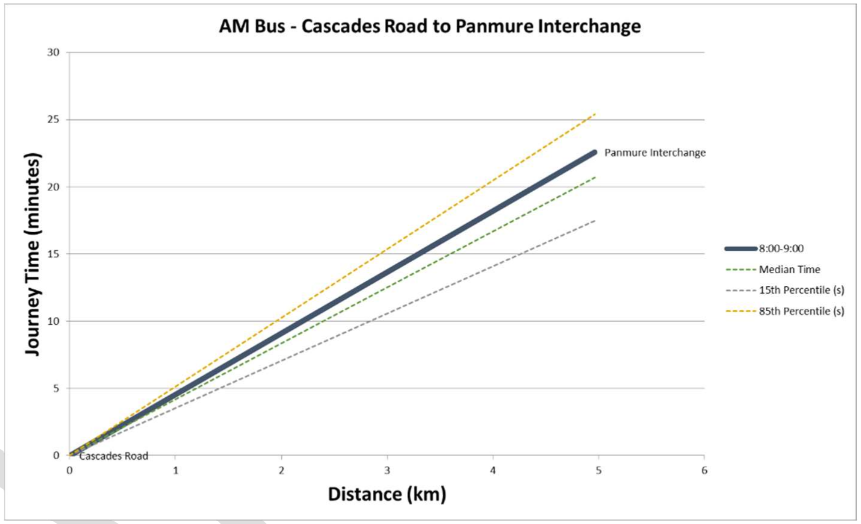
Bus travel time for key corridors in the model also fit reasonably well with observed (Figure 28 - Figure 29). The routes are:

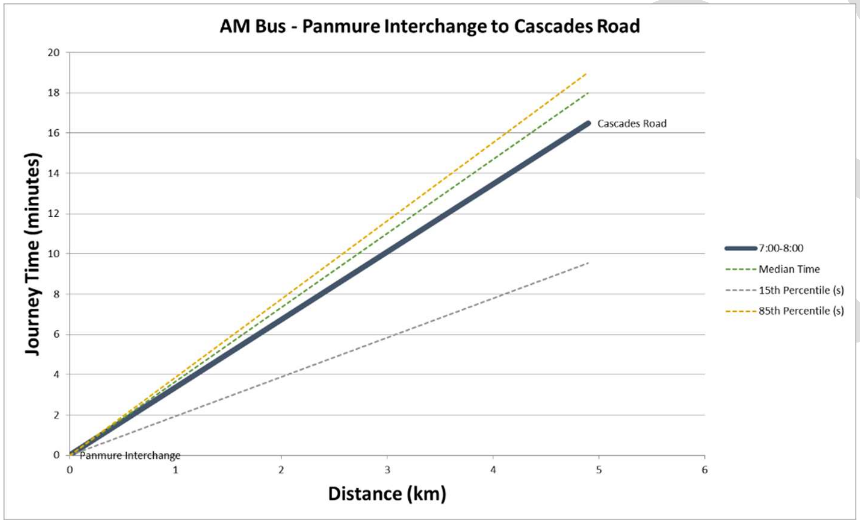
- Bus Route 70 – between Botany Town Centre and Panmure Interchange.
- Bus Route 72 – between Cascades Road and Panmure Interchange.

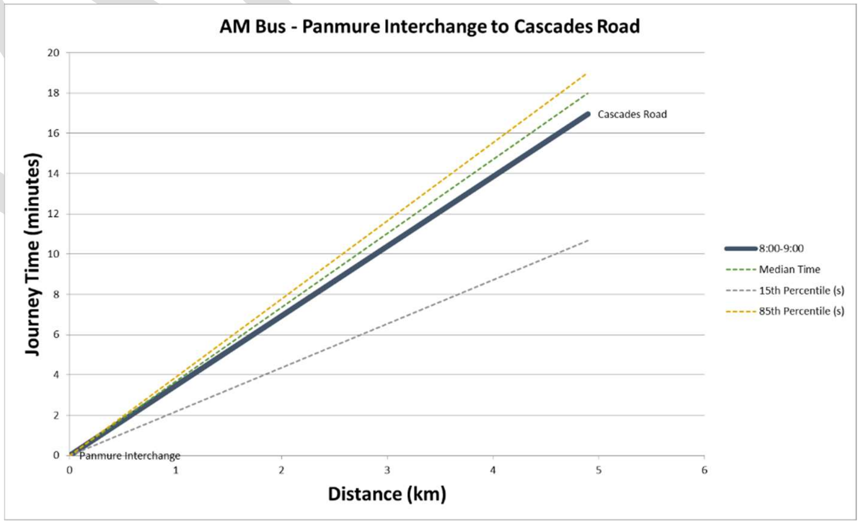
From the bus journey time graphs, it is noted that

- For the AM peak, modelled travel time from the Botany to Panmure Town Centre is low in the first hour. Overall 88% of the routes meet the Criteria for the AM peak.
- For the PM peak, modelled travel time between the Botany and Panmure from Jellicoe Road to Ti Rakau Drive is high in the second hour. The additional travel time is occurring in the Panmure area and does not impact on the focus area. For the future year, the bus travel time along this route will be monitored to ensure it does not increase unrealistically. Overall 75% of the routes meet the Criteria for the PM peak which is below the target 85%.


AM Bus - Cascades Road to Panmure Interchange
Journey Time (minutes)
Distance (km)
Panmure Interchange
Cascades Road
7:00-8:00
Median Time
15th Percentile (s)
85th Percentile (s)


AM Bus - Cascades Road to Panmure Interchange
Journey Time (minutes)
Distance (km)
Panmure Interchange
Cascades Road
8:00-9:00
Median Time
15th Percentile (s)
85th Percentile (s)


AM Bus - Panmure Interchange to Cascades Road
Journey Time (minutes)
Distance (km)
Cascades Road
Panmure Interchange
7:00-8:00
Median Time
15th Percentile (s)
85th Percentile (s)


AM Bus - Panmure Interchange to Cascades Road
Journey Time (minutes)
Distance (km)
Cascades Road
Panmure Interchange
8:00-9:00
Median Time
15th Percentile (s)
85th Percentile (s)

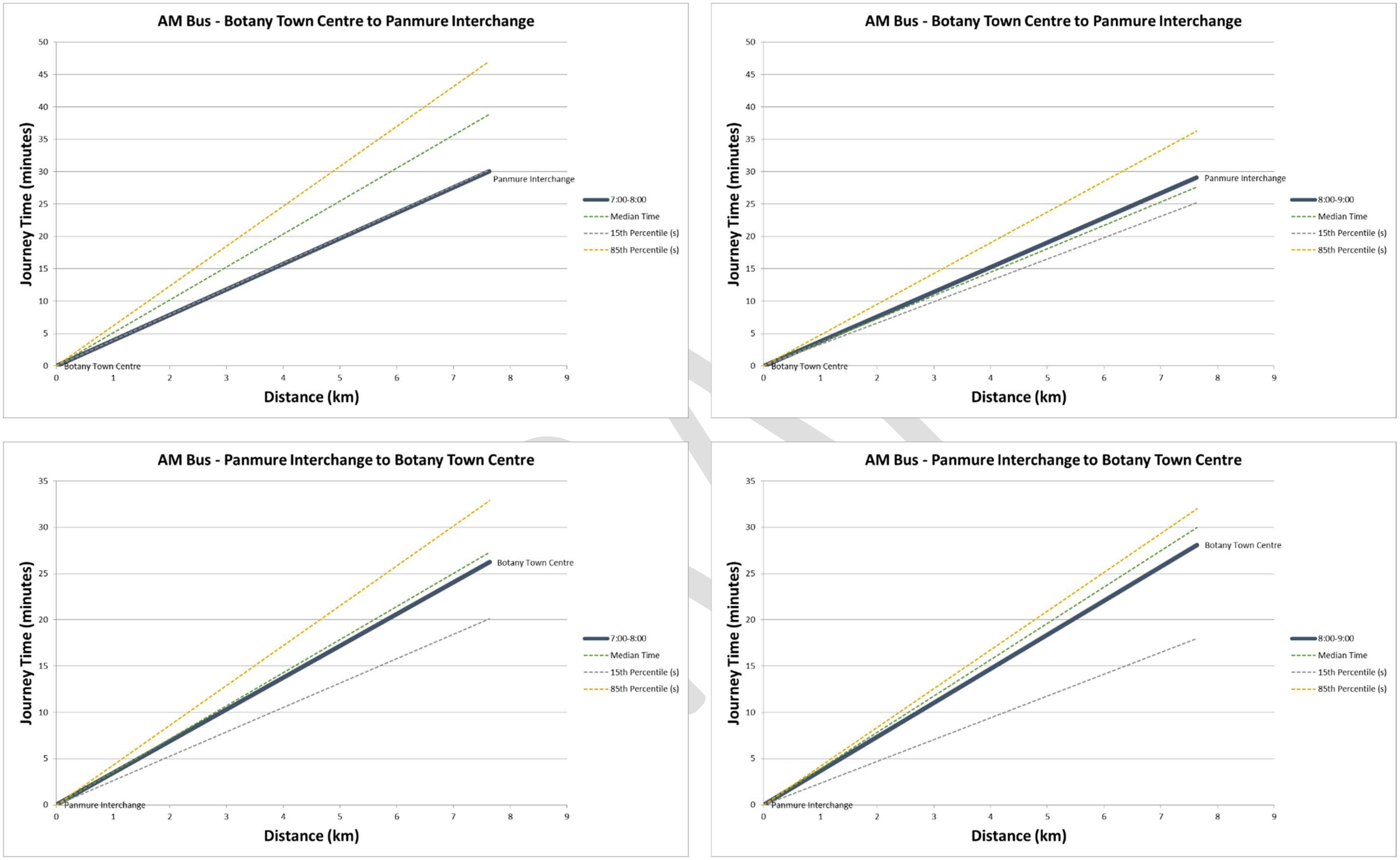
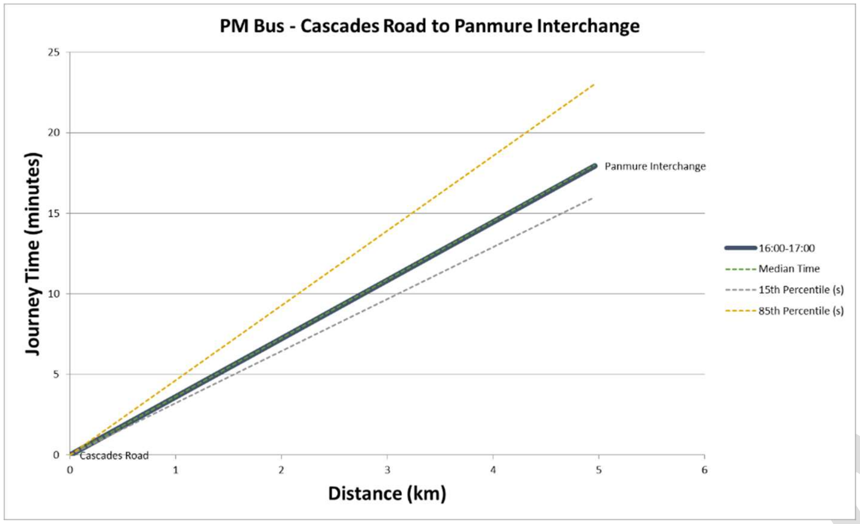
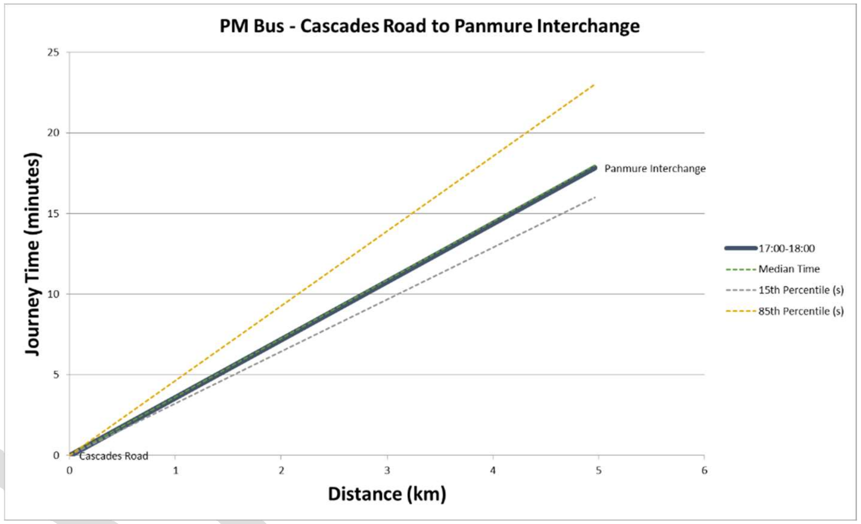
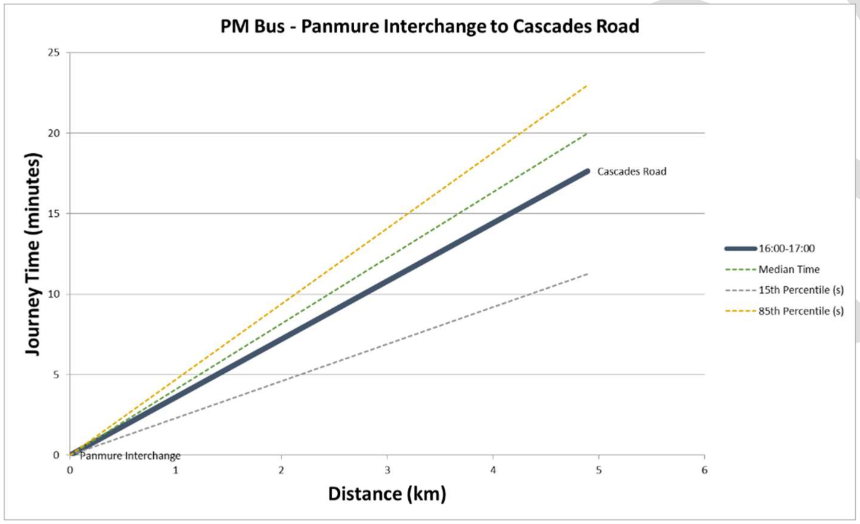
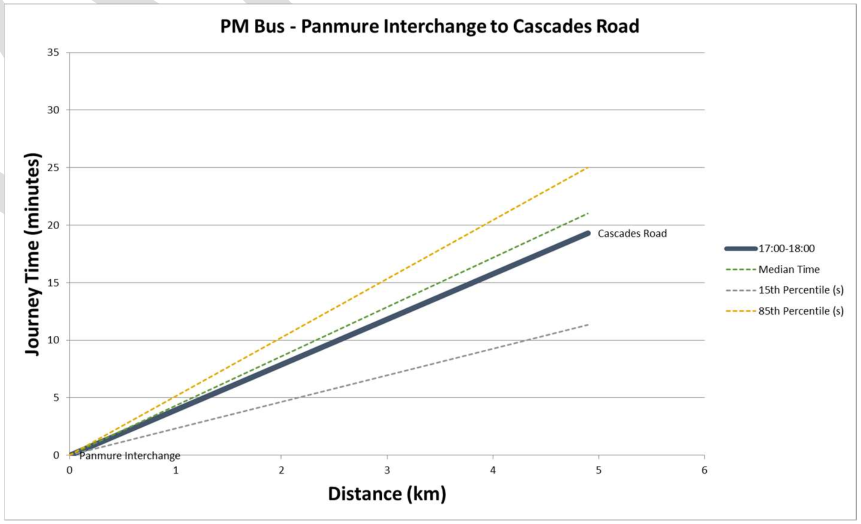



Figure 28 – Travel Time Validation: AM Bus


PM Bus - Cascades Road to Panmure Interchange
Journey Time (minutes)
Distance (km)
Cascades Road
Panmure Interchange
16:00-17:00
Median Time
15th Percentile (s)
85th Percentile (s)


PM Bus - Cascades Road to Panmure Interchange
Journey Time (minutes)
Distance (km)
Cascades Road
Panmure Interchange
17:00-18:00
Median Time
15th Percentile (s)
85th Percentile (s)


PM Bus - Panmure Interchange to Cascades Road
Journey Time (minutes)
Distance (km)
Panmure Interchange
Cascades Road
16:00-17:00
Median Time
15th Percentile (s)
85th Percentile (s)


PM Bus - Panmure Interchange to Cascades Road
Journey Time (minutes)
Distance (km)
Panmure Interchange
Cascades Road
17:00-18:00
Median Time
15th Percentile (s)
85th Percentile (s)

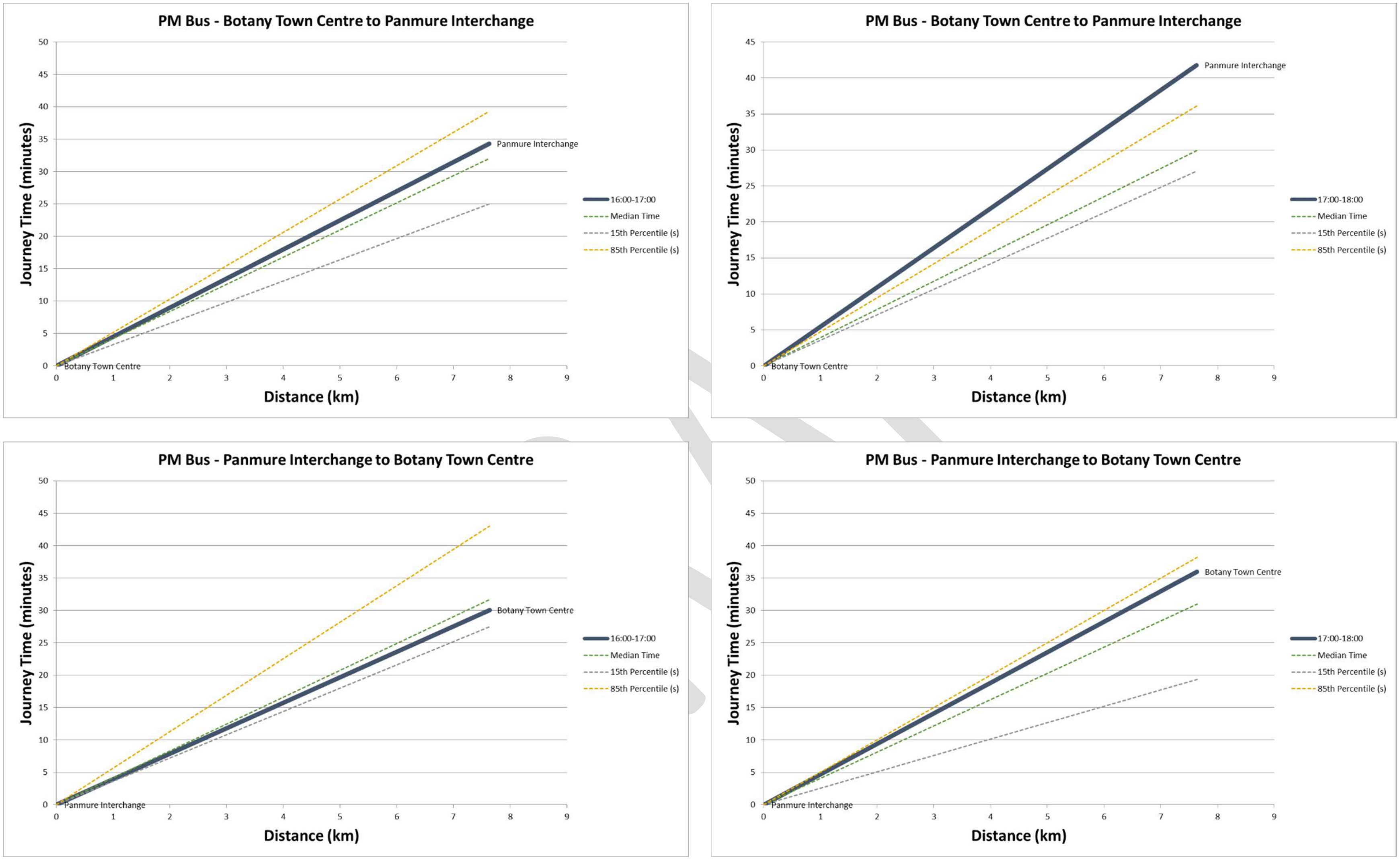



Figure 29 - Travel Time Validation: PM Bus

## 5.8 Traffic Congestion Check

Traffic count and travel time data are the principle measures of the model performance. Traffic congestion on the network was monitored as an additional sense-check of model performance.

Side-by-side comparison to Google's live traffic view-mode for Thursday 21 February 2019 show that the model represents congestion on the network reasonably well (Figure 30 and Figure 31). In the AM peak, less congestion was seen on Ti Rakau Drive Northbound in the model compared to observed, and this was reflected in the faster travel time for that segment. However, also in the AM, although less congestion was seen on Pakuranga Highway Westbound in the model compared to observed, this was not reflected in the travel time validation. In the PM peak, less congestion was seen on Ti Rakau Eastbound in the model, however this was not reflected in the travel time validation.

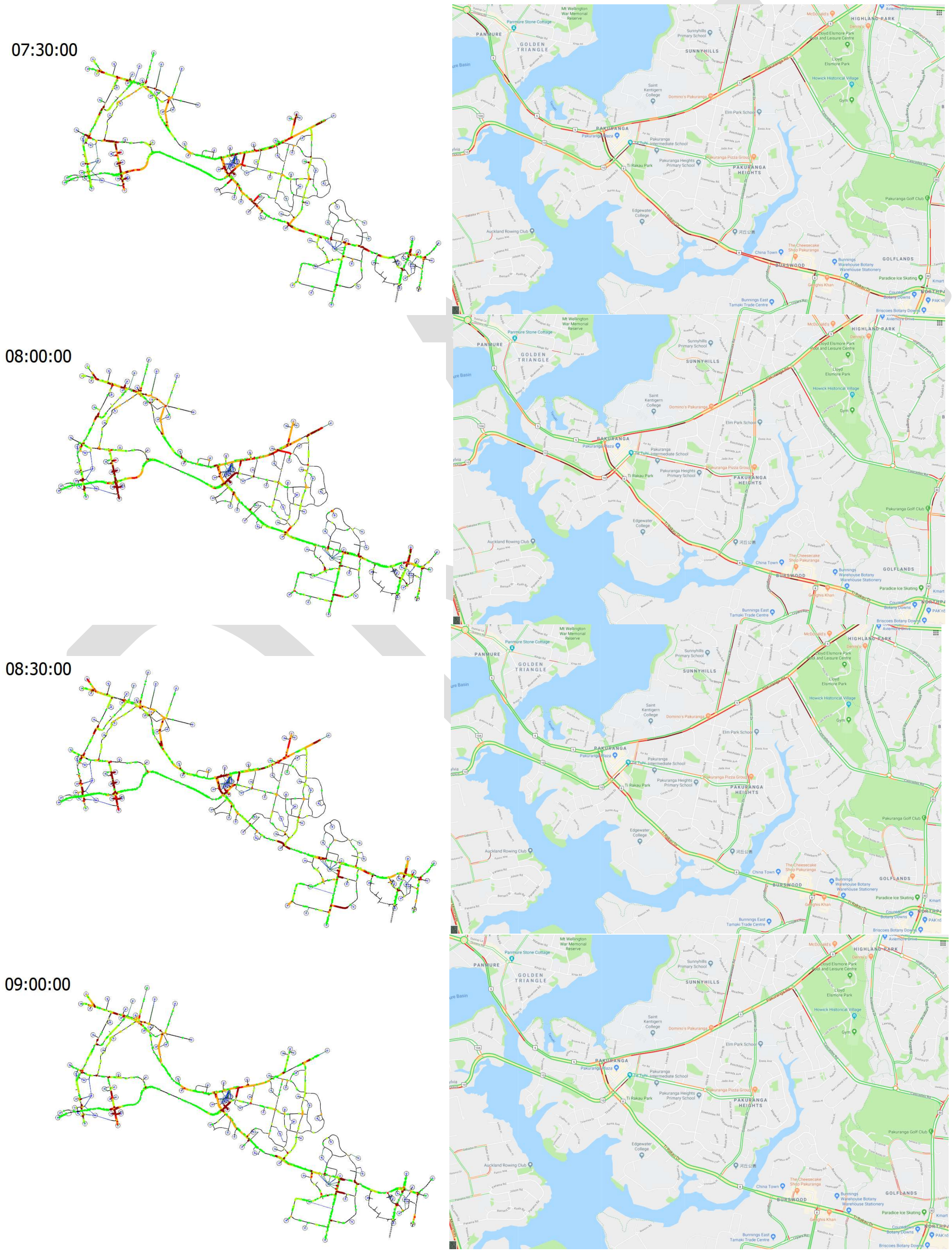



Figure 30 – AM Modelled Congestion versus Observed

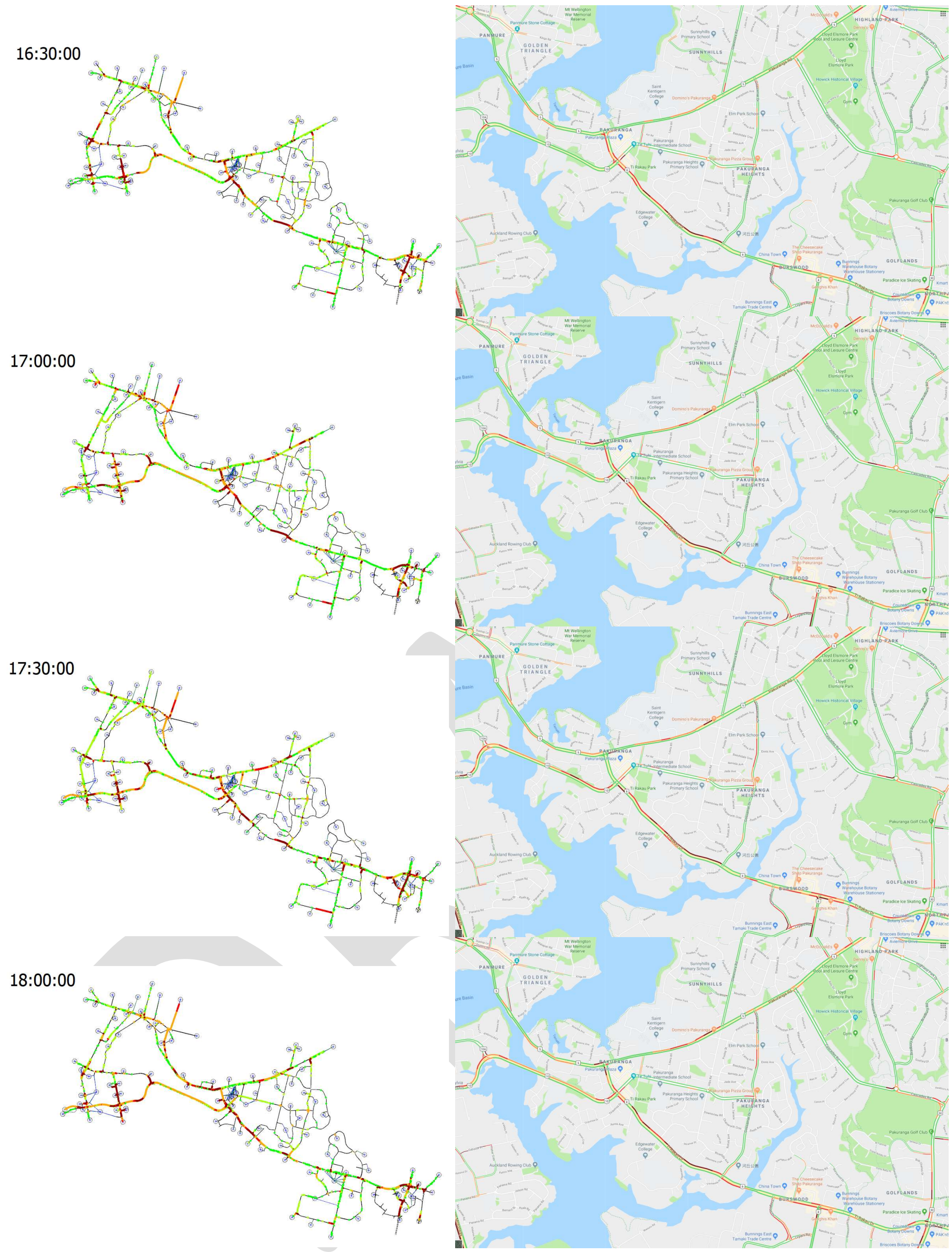



Figure 31 - PM Modelled Congestion versus Observed

This comparison is useful to understand the location of the congestion however the exact definition of congestion in Google's traffic is unknown. Hence it is used as an indication.

## 5.9 Route Choice Sense Check

Route choice in the model could not be directly calibrated and/or validated because there was no available data. However, sense-checks were made in the **static** model (which contributes 80% of the route choice) using previous experiences and observed traffic count-split information at intersections. Overall, route distribution in the model appears reasonable (Figure 32 - Figure 34).

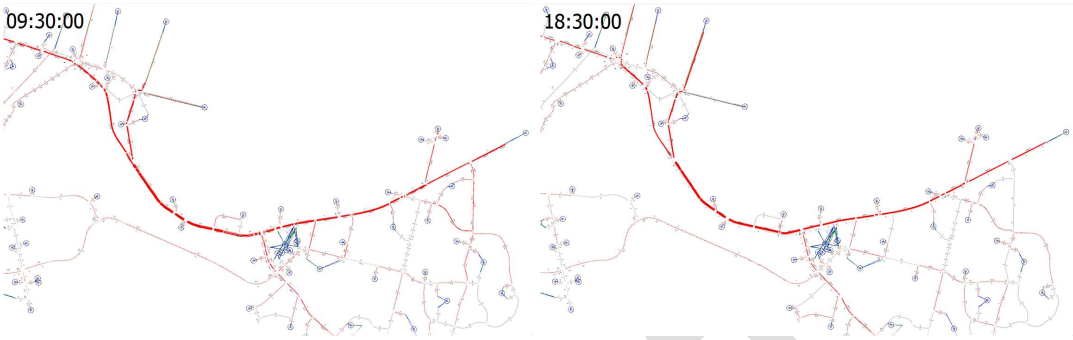



Figure 32 - Route Choice Split: AM Panmure Bridge Westbound (left) and PM Panmure Bridge Eastbound (right)

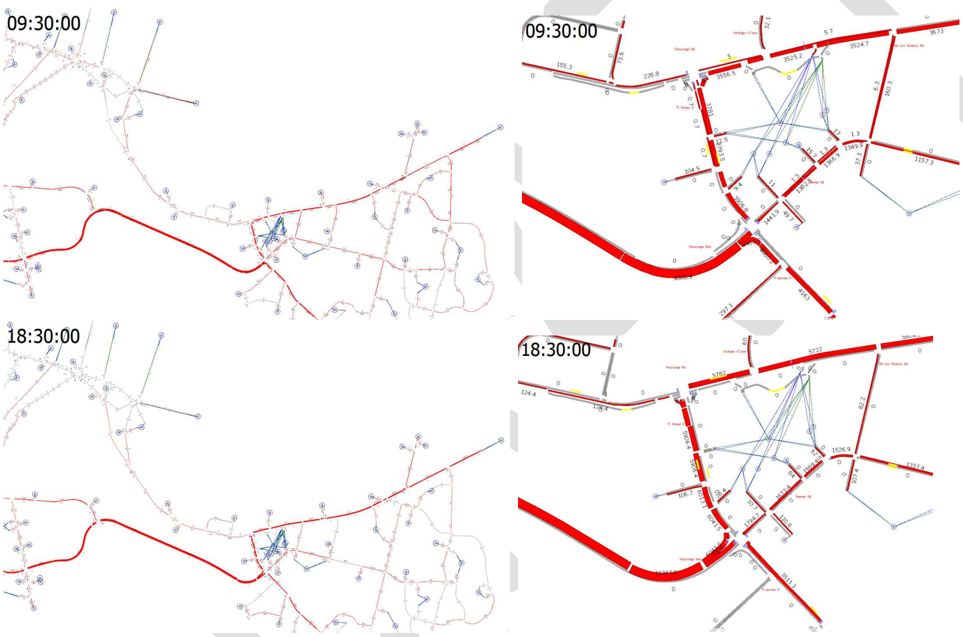



Figure 33 - Route Choice Split: AM Pakuranga Highway Westbound (above) and PM Pakuranga Highway Eastbound (below)

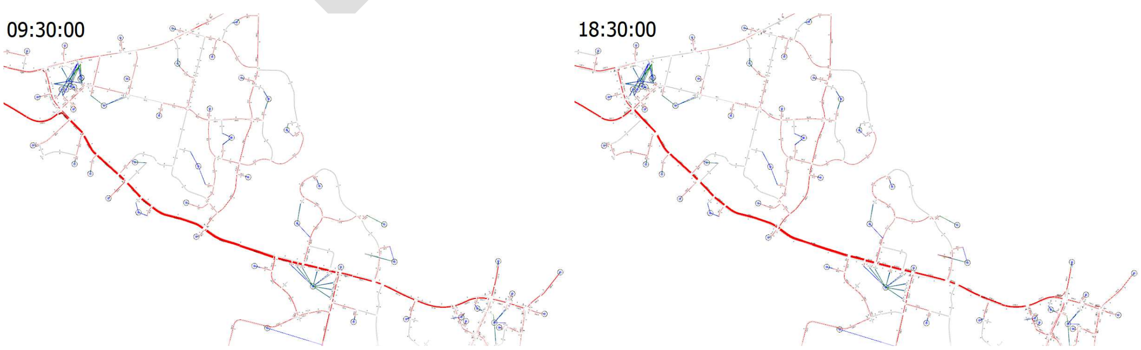



Figure 34 - Route Choice Split: AM Pakuranga Highway Westbound (above) and PM Pakuranga Highway Eastbound (below)

## 5.10 Model Stability

Model stability was monitored and found to be within acceptable thresholds of a coefficient of variance (COV) <5% across the modelled periods, except in the AM past 9am (Figure 35). However, since the demand and the total travel time are fulling at approximately the same profile, this is not an issue.

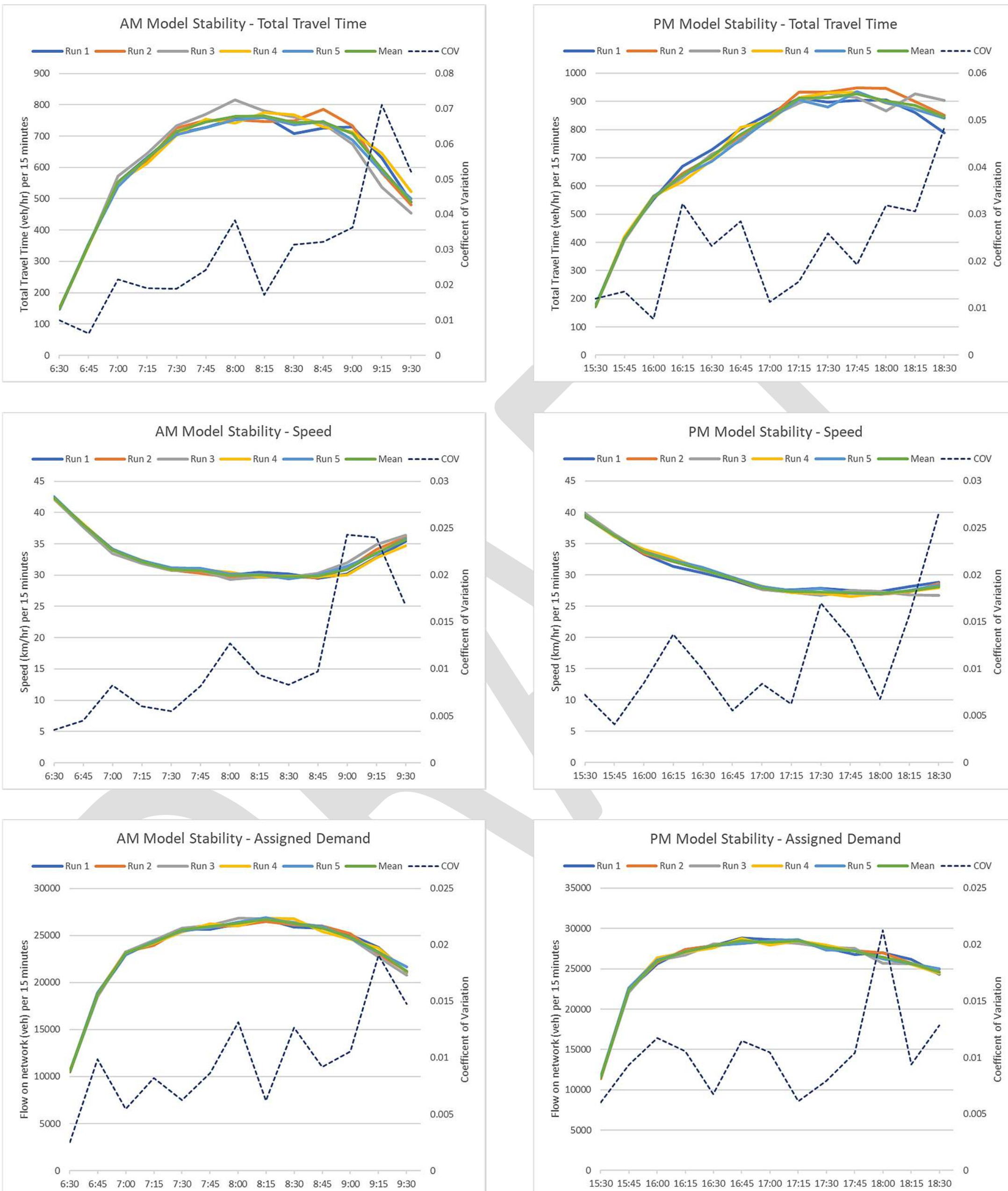



Figure 35 - Model Stability: Total Travel Time, Speed and Flow Plots

# 6 Conclusion

This report details the update and calibration/validation of the Aimsun model for the Eastern Busway Project. The purpose of this model is to provide a consistent and common base for project developments in the East Auckland Area, primarily along Ti Rakau Drive for the EB 2 and EB3 detailed design work.

The model covers two three-hour peak periods (6.30 am – 9.30 am, and 3.30 pm – 6.30 pm). The modelled periods were chosen to capture the congestion typically experienced in the modelled area.

The model consists of macro and micro tiers with the respective assignment methods: static assignment and microscopic dynamic assignment (DTA). The macro tier provides an interim stage to calibrate the demand through demand adjustment and to generate 80% of paths for the micro DTA. Based on previous modelling of the area, an 80-to-20 split in static versus dynamic path assignment was considered appropriate. This gave better control of modelling route choice in the area and sense-checks during the model development process showed that route distribution in the model is reasonable.

Various observed data were provided by Auckland Transport (AT) for the model development. These included traffic counts, travel time, public transport timing, and signal timing.

The traffic demands come from the AMETI EMME traffic model and were processed before assigning to the Aimsun model. This demand interface process includes a minor refinement of AMETI traffic model zones and application of 2-to-3 hour expansion factors to fit the Aimsun model period. Demand adjustment as part of the validation process was done manually.

The model network was developed in line with the Auckland Dynamic Traffic Assignment Model (ADTA) network coding guideline, which sets out the recommended network coding methodology for Aimsun models in Auckland. This included a standard system of classification and labelling of different turn movement types which were important function variables in the ADTA-developed cost functions also adopted in this model for calculating junction and turn delays.

Model validation showed that the model meets the validation target criteria for Category C: Urban Area in NZTA Model Development Guidelines on individual link flows and turn flows for each hour between 7am – 9am, and 4pm – 6pm. Travel times in the model fit reasonably well with the observed.

Overall, the base year model is considered acceptably calibrated and validated for the purposes of the EB2/3 design work.

Appendix A

# Traffic to Aimsun Zone Correspondence

| Aimsun Zone | NEW CORDON Aimsun-EMME REF |
|---|---|
| 1 | 1 |
| 2 | 2 |
| 3 | 3 |
| 4 | 4 |
| 5 | 5 |
| 6 | 6 |
| 7 | 7 |
| 8 | 8 |
| 9 | 9 |
| 10 | 10 |
| 11 | 11 |
| 12 | 12 |
| 13 | 13 |
| 14 | 14 |
| 15 | 15 |
| 16 | 16 |
| 17 | 17 |
| 18 | 18 |
| 19 | 19 |
| 20 | 20 |
| 21 | 21 |
| 22 | 22 |
| 23 | 23 |
| 24 | 24 |
| 25 | 25 |
| 26 | 26 |
| 27 | 27 |
| 28 | 28 |
| 29 | 29 |
| 30 | 30 |
| 31 | 31 |
| 205 | 205 |
| 210 | 210 |
| 286 | 286 |
| 296 | 296 |
| 297 | 297 |
| 412 | 412 |
| 540 | 540 |
| 545 | 545 |
| 546 | 546 |
| 547 | 547 |
| 548 | 548 |
| 555 | 555 |
| 560 | 560 |
| 561 | 561 |
| 562 | 562 |
| 563 | 563 |
| 568 | 568 |
| 572 | 572 |
| 582 | 582 |
| 583 | 583 |
| 599 | 599 |
| 649 | 649 |
| 650 | 650 |
| 651 | 651 |
| 652 | 652 |
| 653 | 653 |
| 654 | 654 |
| 655 | 655 |
| 656 | 656 |
| 657 | 657 |
| 658 | 658 |
| 659 | 659 |
| 660 | 660 |
| 662 | 662 |
| 663 | 663 |
| 664 | 664 |

| Aimsun Zone | NEW CORDON Aimsun-EMME REF |
|---|---|
| 665 | 665 |
| 666 | 666 |
| 667 | 667 |
| 668 | 668 |
| 669 | 669 |
| 670 | 670 |
| 671 | 671 |
| 672 | 672 |
| 673 | 673 |
| 677 | 677 |
| 678 | 678 |
| 693 | 693 |
| 694 | 694 |
| 695 | 695 |
| 697 | 697 |
| 698 | 698 |
| 699 | 699 |
| 705 | 705 |
| 706 | 706 |
| 865 | 865 |
| 867 | 867 |
| 868 | 868 |
| 869 | 869 |
| 870 | 870 |
| 871 | 871 |
| 873 | 873 |
| 896 | 896 |
| 897 | 897 |
| 900 | 900 |
| 901 | 901 |
| 902 | 902 |
| 903 | 903 |
| 1013 | 13 |
| 1017 | 17 |
| 1654 | 654 |
| 1656 | 656 |
| 1902 | 902 |
| 1903 | 903 |
| 2903 | 903 |

## Appendix B

# Road Parameters

Table B1 – Key Road Type Parameters: Main

| | Maximum Speed (km/h) | User-Defined Cost | Third User-Defined Cost | Capacity per Lane (PCUs/h) |
|---|---|---|---|---|
| Arterial | 50 | 1.4 | 1.2 | 1600 |
| Arterial - 50k Reeves | 50 | 1.6 | 1.4 | 1200 |
| Arterial - 50k Reeves EBD | 50 | 1.6 | 1.4 | 1200 |
| Arterial - Divided | 60 | 1.2 | 1.1 | 1600 |
| Busway | 60 | 1 | 1.2 | 1600 |
| Collector | 50 | 2 | 1.4 | 900 |
| Collector - Ireland | 50 | 2 | 1.4 | 900 |
| Expressway | 80 | 0.9 | 0.2 | 2100 |
| Local - 30k | 30 | 5 | 2 | 500 |
| Local - 50k | 50 | 3 | 1.6 | 500 |
| Minor Arterial | 50 | 1.4 | 1.2 | 1400 |

Table B2 - Key Road Type Parameters: Dynamic Models

| Road-Type Parameters | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Dynamic Models - Section Parameters** | | | | | | | | |
| | **Lane Changing** | | | | **Side Lane** | | | **Consider Two-Lane Car Following Model** |
| | **Cooperation (%)** | **Aggressiveness (%)** | **Breaking Intensity** | **Imprudent Lane Changing** | **Cooperation Distance** | **Merging Distance** | **Merge: First veh on is first veh off** | |
| **Arterial** | 50 | 0 | Regular | No | Whole Lane | Default | Yes | Yes |
| **Arterial - 50k Reeves** | 50 | 0 | Regular | No | Whole Lane | Default | Yes | Yes |
| **Arterial - 50k Reeves EBD** | 50 | 0 | Regular | No | Whole Lane | Default | Yes | Yes |
| **Arterial - Divided** | 80 | 0 | Regular | No | Whole Lane | Default | Yes | Yes |
| **Busway** | 50 | 0 | Regular | No | Whole Lane | Default | Yes | Yes |
| **Collector** | 50 | 0 | Regular | No | Whole Lane | Default | Yes | Yes |
| **Collector - Ireland** | 50 | 0 | Regular | No | Whole Lane | Default | Yes | Yes |
| **Expressway** | 80 | 0 | Regular | No | Whole Lane | Default | Yes | Yes |
| **Local - 30k** | 50 | 0 | Regular | No | Whole Lane | Default | Yes | Yes |
| **Local - 50k** | 50 | 0 | Regular | No | Whole Lane | Default | Yes | Yes |
| **Minor Arterial** | 50 | 0 | Regular | No | Whole Lane | Default | Yes | Yes |

| | **Queue Discharge** | | |
|---|---|---|---|
| | **Acceleration Factor** | **Additional Reaction Time at Stop (sec)** | **Additional Reaction Time at Traffic Light (sec)** |
| **Arterial** | No Change | 0 | 0 |
| **Arterial - 50k Reeves** | No Change | 0 | 0 |
| **Arterial - 50k Reeves EBD** | No Change | 0 | 0 |
| **Arterial - Divided** | No Change | 0 | 0 |
| **Busway** | No Change | 0 | 0 |
| **Collector** | No Change | 0 | 0 |
| **Collector - Ireland** | No Change | 0 | 0 |
| **Expressway** | No Change | 0 | 0 |
| **Local - 30k** | No Change | 0 | 0 |
| **Local - 50k** | No Change | 0 | 0 |
| **Minor Arterial** | No Change | 0 | 0 |

Table B3 - Key Road Type Parameters: Dynamic Models continued

| Road-Type Parameters | | | | | | |
|---|---|---|---|---|---|---|
| **Dynamic Models - Turn Parameters** | | | | | | |
| | **Microscopic Model** | | | | | |
| | **Distance Zone 1 (m)** | **Distance Zone 2 (m)** | **Additional Waiting Time Before Losing Turn (sec)** | **Yellow Box Speed (km/h)** | | |
| **Arterial** | 333.3 | 166.67 | 0 | 10 | | |
| **Arterial - 50k Reeves** | 333.3 | 166.67 | 0 | 10 | | |
| **Arterial - 50k Reeves EBD** | 333.3 | 166.67 | 0 | 10 | | |
| **Arterial - Divided** | 333.3 | 166.67 | 0 | 10 | | |
| **Busway** | 333.3 | 166.67 | 0 | 10 | | |
| **Collector** | 277.78 | 138.89 | 0 | 10 | | |
| **Collector - Ireland** | 277.78 | 138.89 | 0 | 10 | | |
| **Expressway** | 555.56 | 277.78 | 0 | 10 | | |
| **Local - 30k** | 277.78 | 138.89 | 0 | 10 | | |
| **Local - 50k** | 277.78 | 138.89 | 0 | 10 | | |
| **Minor Arterial** | 277.78 | 138.89 | 0 | 10 | | |
| | **Giveway Model** | | | | | |
| | **Initial Safety Margin (sec)** | **Initial Giveway Time Factor** | **Visibility to Give Way (m)** | **Final Safety Margin (sec)** | **Final Give Way Time Factor** | **Visibility along Main Stream (m)** |
| **Arterial** | 3 | 1 | 25 | 1 | 2 | 60 |
| **Arterial - 50k Reeves** | 3 | 1 | 25 | 1 | 2 | 60 |
| **Arterial - 50k Reeves EBD** | 3 | 1 | 25 | 1 | 2 | 60 |
| **Arterial - Divided** | 3 | 1 | 25 | 1 | 2 | 60 |
| **Busway** | 3 | 1 | 25 | 1 | 2 | 60 |
| **Collector** | 3 | 1 | 25 | 1 | 2 | 60 |
| **Collector - Ireland** | 3 | 1 | 25 | 1 | 2 | 60 |
| **Expressway** | 3 | 1 | 25 | 1 | 2 | 100 |
| **Local - 30k** | 3 | 1 | 25 | 1 | 2 | 60 |
| **Local - 50k** | 3 | 1 | 25 | 1 | 2 | 60 |
| **Minor Arterial** | 3 | 1 | 25 | 1 | 2 | 60 |

Appendix C

# Vehicle Parameters

Table C1 - Key Vehicle Parameters

| Vehicle Parameters | | | | |
|---|---|---|---|---|
| **Main** | | | | |
| **Length (m)** | **Mean** | **Deviation** | **Minimum** | **Maximum** |
| **Car** | 4.5 | 0.4 | 3.3 | 5.3 |
| **Truck** | 11.3 | 4.3 | 6.5 | 19.1 |
| **Bus** | 13 | 1 | 12.6 | 13.5 |
| **Width (m)** | **Mean** | **Deviation** | **Minimum** | **Maximum** |
| **Car** | 1.75 | 0 | 1.75 | 1.75 |
| **Truck** | 2.4 | 0 | 2.4 | 2.4 |
| **Bus** | 2.4 | 0 | 2.4 | 2.4 |
| **Max Desired Speed (km/h)** | **Mean** | **Deviation** | **Minimum** | **Maximum** |
| **Car** | 110 | 10 | 80 | 120 |
| **Truck** | 100 | 5 | 80 | 110 |
| **Bus** | 90 | 10 | 70 | 100 |
| **Dynamic Models - Main** | | | | |
| **Speed Acceptance** | **Mean** | **Deviation** | **Minimum** | **Maximum** |
| **Car** | 1.05 | 0.1 | 0.9 | 1.3 |
| **Truck** | 1.05 | 0.1 | 1 | 1.1 |
| **Bus** | 1 | 0.1 | 0.9 | 1.1 |
| **Clearance (m)** | **Mean** | **Deviation** | **Minimum** | **Maximum** |
| **Car** | 1.5 | 0.5 | 1 | 2.3 |
| **Truck** | 2 | 0.5 | 1.5 | 3 |
| **Bus** | 1.5 | 0.5 | 1 | 2.5 |
| **Max Give Way Time (secs)** | **Mean** | **Deviation** | **Minimum** | **Maximum** |
| **Car** | 10 | 2.5 | 5 | 15 |
| **Truck** | 25 | 5 | 10 | 35 |
| **Bus** | 35 | 10 | 20 | 60 |
| **Dynamic Models - Experiment Defaults** | | | | |
| | **Reaction Time** | **Reaction Time at Stop** | **Reaction Time for Front Veh** | **Probability** |
| **Car** | 0.8 | 1.15 | 1.35 | 1 |
| **Truck** | 0.8 | 1.3 | 1.7 | 1 |
| **Bus** | 0.8 | 1.3 | 1.7 | 1 |

Table C1 - Key Vehicle Parameters continued

| Vehicle Parameters | | | | |
|---|---|---|---|---|
| **Microscopic Model - Main** | | | | |
| **Max Acceleration (m/s2)** | **Mean** | **Deviation** | **Minimum** | **Maximum** |
| **Car** | 2.7 | 0.2 | 2.2 | 3.5 |
| **Truck** | 1.45 | 0.6 | 0.5 | 2.4 |
| **Bus** | 1 | 0.3 | 0.8 | 1.8 |
| **Normal Deceleration (m/s2)** | **Mean** | **Deviation** | **Minimum** | **Maximum** |
| Car | 3.5 | 0.2 | 3 | 4 |
| Truck | 3 | 0.3 | 2 | 3.5 |
| Bus | 2 | 1 | 1.5 | 4.5 |
| **Max Deceleration (m/s2)** | **Mean** | **Deviation** | **Minimum** | **Maximum** |
| Car | 6 | 0.5 | 5 | 7 |
| Truck | 5 | 0.5 | 4 | 6 |
| Bus | 5 | 1 | 4 | 6 |
| **Sensitivity Factor** | **Mean** | **Deviation** | **Minimum** | **Maximum** |
| Car | 1.1 | 0 | 1.1 | 1.1 |
| Truck | 1.1 | 0 | 1.1 | 1.1 |
| Bus | 1 | 0 | 1 | 1 |
| **Gap (secs)** | **Mean** | **Deviation** | **Minimum** | **Maximum** |
| Car | 1.1 | 0.2 | 0.5 | 2 |
| Truck | 1.3 | 0.2 | 0.5 | 2.5 |
| Bus | 1.1 | 0.2 | 0.5 | 2.5 |
| **Headway Aggressiveness** | **Mean** | **Deviation** | **Minimum** | **Maximum** |
| Car | 0 | 0 | -1 | 1 |
| Truck | 0 | 0 | -1 | 1 |
| Bus | 0 | 0 | -1 | 1 |
| **Favours Stop and Go** | | | | |
| **Car** | No | | | |
| **Truck** | No | | | |
| **Bus** | No | | | |
| **Lane-Changing Model** | **Staying in Overtaking Lane** | **Imprudent Lane Changing** | | |
| **Car** | No | No | | |
| **Truck** | No | No | | |
| **Bus** | No | No | | |
| **Margin for Overtaking Manouver (secs)** | **Mean** | **Deviation** | **Minimum** | **Maximum** |
| **Car** | 5 | 3 | 1 | 10 |
| **Truck** | 5 | 3 | 1 | 10 |
| **Bus** | 5 | 3 | 1 | 10 |

Table C1 - Key Vehicle Parameters continued

| Vehicle Parameters | | | |
|---|---|---|---|
| **Static Models** | | | |
| | **Transportation Mode** | **PCUs** | |
| **Car** | None | 1 | |
| **Truck** | None | 2.5 | |
| **Bus** | None | 2.5 | |

Appendix D

# Bus Services List

| Base 2018 Bus Services |
|---|
| 31 |
| 35 |
| 70 |
| 72X |
| 72M |
| 72C |
| 352 |
| 351 |
| 353 |
| 711 |
| 355 |
| 739 |
| 712 |
| 735 |
| 733 |
| 734 |
| 323 |
| 743 |
| 751 |

Appendix E

# Attribute Overrides and Applicability

**Attribute Overrides and Applicability**

| Attribute Override Name | AM | PM | Static | Dynamic |
|---|---|---|---|---|
| Base 2016 Yellow Box | √ | √ | √ | √ |
| Base 2018 Section Speed | √ | √ | √ | √ |
| Base 2018 Turn Capacity | √ | √ | √ | √ |
| Harris Rd Lane Cooperation | √ | √ | √ | √ |
| Ti Rakau Lane Cooperation | √ | | √ | √ |
| Pakuranga Rd Look Aheads | √ | | √ | √ |
| Pakuranga Rd Section Speed | | √ | √ | √ |

Appendix F

# Junction and Turn Delay Calculation Parameters

**Intersection Coding Adopted from ADTA**

To assist with scripting and automation, a classification system was applied to turn movements to signify different conflict situations at intersections. The external ID of each turn movement was set to a 4-digit code following the convention below:
XYZZ
where **X** = intersection type
**Y** = number of approaches/legs
**ZZ** = movement type
These 4-digit codes were used in each JDF and TPF cost function scripts to allocate the correct calibration parameters to each turn at the calibration stage

| X | INTERSECTION TYPE |
|---|---|
| 1 | Signalised |
| 2 | Roundabout |
| 3 | Priority intersection – Give-way sign at Minor Road |
| 4 | Priority intersection – Stop sign at Minor Road |
| 5 | Two-way one lane bridge |
| 6 | Zebra pedestrian crossing |
| **Y** | **NUMBER OF APPROACHES** |
| **ZZ** | **MOVEMENT TYPE[3]** |
| 00 | Unopposed Turn (e.g. Through and left turn on Major Road, as well as signalised movements) |
| 01 | Left Turn – 1-lane opposing |
| 02 | Left Turn – 2-lane or more opposing |
| 03 | Through Movement Crossing One-way Road – 2-lane one-way |
| 04 | Through Movement Crossing One-way Road – 3-lane one-way |
| 05 | Through Movement Crossing One-way Road – 4-lane one-way |
| 06 | Through Movement Crossing Two-way Road – 2-lane two-way |
| 07 | Through Movement Crossing Two-way Road – 4-lane two-way |
| 08 | Through Movement Crossing Two-way Road – 6-lane two-way |
| 09 | Right Turn from Major Road - Across 1 lane |
| 10 | Right Turn from Major Road - Across 2 lanes |
| 11 | Right Turn from Major Road - Across 3 lanes |
| 12 | Right Turn from Minor Road – One-way |
| 13 | Right Turn from Minor Road – 2-lane two-way Major Road / Across 1 lane |
| 14 | Right Turn from Minor Road – 4-lane two-way Major Road / Across 2 lanes |
| 15 | Right Turn from Minor Road – 6-lane two-way Major Road / Across 3 lanes |
| 16 | Staged Right Turn from Minor Road – Across 1 lane with flush median or merge lane in the middle |
| 17 | Staged Right Turn from Minor Road – Across 2 lanes with flush median or merge lane in the middle |
| 18 | Staged Right Turn from Minor Road – Across 3 lanes with flush median or merge lane in the middle |

## ADTA-Calibrated Intercept and Slope Values for turn types used in JDF

| Turn External Id | Number of Approach lanes for this Movement | Intercept | Slope |
|---|---|---|---|
| 1x01 | x | 735 | 0.37 |
| 1x02 | x | 925 | 0.35 |
| 1x03 | x | 400 | 0.18 |
| 1x04 | x | 330 | 0.15 |
| 1x06 | x | 300 | 0.08 |
| 1x07 | x | 225 | 0.05 |
| 1x09 | x | 595 | 0.29 |
| 1x10 | x | 595 | 0.25 |
| 1x11 | x | 630 | 0.27 |
| 1x13 | x | 300 | 0.08 |
| 1x14 | x | 225 | 0.05 |
| 1x15 | x | 225 | 0.05 |
| 2xxx | 1 | 1,200 | 0.7 |
| 2xxx | 2 | 2,500 | 0.8 |
| 2xxx | 3 | 3,100 | 0.8 |
| 3x01 | x | 735 | 0.37 |
| 3x02 | x | 925 | 0.35 |
| 3x03 | x | 400 | 0.18 |
| 3x04 | x | 330 | 0.15 |
| 3x05 | x | 330 | 0.15 |
| 3x06 | x | 300 | 0.08 |
| 3x07 | x | 225 | 0.05 |
| 3x08 | x | 225 | 0.05 |
| 3x09 | x | 595 | 0.29 |
| 3x10 | x | 595 | 0.25 |
| 3x11 | x | 630 | 0.27 |
| 3x12 | x | 400 | 0.18 |
| 3x13 | x | 300 | 0.08 |
| 3x14 | x | 225 | 0.05 |
| 3x15 | x | 225 | 0.05 |
| 3x16 | x | 400 | 0.18 |
| 3x17 | x | 330 | 0.15 |
| 3x18 | x | 330 | 0.15 |
| 4x01 | x | 510 | 0.21 |
| 4x02 | x | 505 | 0.09 |
| 4x03 | x | 355 | 0.15 |
| 4x04 | x | 310 | 0.14 |
| 4x05 | x | 310 | 0.14 |
| 4x06 | x | 230 | 0.05 |
| 4x07 | x | 230 | 0.05 |
| 4x08 | x | 230 | 0.05 |
| 4x09 | x | 595 | 0.29 |
| 4x10 | x | 595 | 0.25 |
| 4x11 | x | 630 | 0.27 |
| 4312 | x | 355 | 0.15 |
| 4313 | x | 230 | 0.05 |
| 4314 | x | 230 | 0.05 |
| 4315 | x | 230 | 0.05 |
| 4316 | x | 355 | 0.15 |
| 4317 | x | 310 | 0.14 |
| 4318 | x | 310 | 0.14 |
| 4412 | x | 355 | 0.15 |
| 4413 | x | 235 | 0.16 |
| 4414 | x | 235 | 0.16 |
| 4415 | x | 230 | 0.05 |
| 4416 | x | 355 | 0.15 |
| 4417 | x | 310 | 0.14 |
| 4418 | x | 310 | 0.14 |
| 5x03 | x | 500 | 0.2 |

Appendix G

# Cost Function Scripts

## Volume Delay Function

```
model = None
tollCarColumn = None
tollTruckColumn = None
assignedVolColumn = None
laneCapacityColumn = None

def checkExperimentContext(context, turning):
	global model
	global tollCarColumn
	global tollTruckColumn
	global assignedVolColumn
	global laneCapacityColumn
	if model == None:
		model = context.experiment.getModel()

	# get the section type
	sectionType = model.getType('GKSection')
	if tollCarColumn == None:
		tollCarColumn = sectionType.getColumnByExternalName ("TOLL - CAR", 0)
	if tollTruckColumn == None:
		tollTruckColumn = sectionType.getColumnByExternalName ("TOLL - TRUCK", 0)

	# get the road type
	roadType = model.getType('GKRoadType')
	if laneCapacityColumn == None:
		laneCapacityColumn = roadType.getColumnByExternalName('Lane Capacity',0)

	turnType = model.getType('GKTurning')
	if assignedVolColumn == None:
		assignedVolColumn = turnType.getColumn('MACRO::' + str(context.experiment.getId()) + '_GKTurning_macroAssignedVolume_0', 0)

def travelTime(context, section, funcVolume):

	global model

	#define the peak hour factor based on peak
	# get the experiment
	experiment = context.experiment
	# get the scenario
	scenario = experiment.getScenario()
	# get the traffic demand
	trafficDemand = scenario.getDemand()
	# get the start time of the demand
	startTime = trafficDemand.initialTime()
	# get the duration of the demand
	assignmentDuration = trafficDemand.duration().hour()

	#set parameters from sections
	speed = section.getSpeed()
	volume = funcVolume.getVolume()
	length = section.length3D()
	capacity = section.getCapacity()
	capacityperlane = section.getRoadType().getDataValueDouble(laneCapacityColumn)
	JA = section.getUserDefinedCost3()

	# assign volume peak hour factor based on peak
	phfVol = 1.0

	# fixed, global factor
	if startTime.hour() == 6:
		phfVol = 1.15
	elif startTime.hour() == 11:
		phfVol = 1.02
	elif startTime.hour() == 15:
		phfVol = 1.05


	# assign speed peak hour factor based on peak
	phfSpeed = 1.0
	'''
	# fixed, global factor
	if startTime.hour() == 6:
		phfSpeed = 1.1595
	elif startTime.hour() == 11:
		phfSpeed = 1.0707
	elif startTime.hour() == 15:
		phfSpeed = 1.1422
	'''
	#calculate additional parameters
	#apply peak volume factor when calculating degree of saturation
	X = (volume * phfVol) / capacity
	T0 = 1000 / (speed / 3.6) # minimum travel time for section

	#calculate dealy based of the Akcelik delay function

	Tf = 1.0 # Analysis Flow Period, taken as 1 hour
	Rf = (Tf*3600) / T0 # unitless ratio
	#JA = 0.2
	eightX = (8.0 * JA * X ) / (capacityperlane * Tf)

	Time = T0 *( 1 + 0.25*Rf*((X-1.0)+((X-1.0)**2 + eightX)**0.5)) #give seconds per Km

	# peak hour travel time in seconds
	peakHourTravelTime = (Time * (length / 1000))
```

```
		# peak hour speed in m/s
		peakHourSpeed = length / peakHourTravelTime
		# three hour average speed in m/s
		threeHourAveSpeed = peakHourSpeed * phfSpeed
		# cap the speed at the section maximum speed
		if threeHourAveSpeed > (speed / 3.6):
			threeHourAveSpeed = (speed / 3.6)
		# four hour average travel time in seconds
		threeHourAveTravelTime = length / threeHourAveSpeed

		return (threeHourAveTravelTime /60)

def distCost(context, section, funcVolume):

		'''
		The distance factor adopted from Wellington N2A model
		P:\429\4291565\Technical\300 Technical\320 Models\321 Network Build\N2A_GeneralisedCostDistanceFactor.xlsx

		Assumptions
		Fuel cost						1.75		$/litre
		fuel consumption					9.5				l/100km
		fuel rate						0.16625		$/km
		Assume gc is just fuel cost

		Assumed acg Value of time		16.27		$/hr, 2002 (EEM urban arterial)
		Update factor to 2015				1.44		EEM
		VoT 2015						23.43		$/hr
		Update factor 2016 estimated 1.01
		VoT 2016 est					23.66		$/hr, 2002 (EEM urban arterial)
		Value of time					2.536		min/$
		gc of fuel						0.422		mins per km

		Assume 0.4 for Car

		Truck factor was agreed to be 1.0
		'''

		# get the length of the section
		length = section.length3D()/1000 # length in km

		# factor for the distance component (unit: mins/km)
		className = str(context.userClass.getName())
		if className[0:3] == "Car":
			distFactor = 0.5
		else:
			distFactor = 1.0

		# get the user defined cost of the section
		roadTypeFactor = section.getUserDefinedCost()

		# calculate the distance cost
		distanceCost = distFactor * roadTypeFactor * length

		return distanceCost

# this function calculates the speed in km/hr of the section
def calculateSpeed(context, section, funcVolume):
		# convert travel time to seconds
		tTime = travelTime(context, section, funcVolume) * 60.0
		# get the section length in metres
		length = section.length3D()
		# calculate and return the speed in km/hr
		return (length / tTime)*3.6

# this function calculates the truck percentage
def calculateTruckPercentage(context, section, funcVolume):
		# get the car volume
		carVolume = (funcVolume.getVolume(model.getCatalog().findByName('Car - ALL', model.getType('GKVehicle'))) +
								funcVolume.getVolume(model.getCatalog().findByName('Car - L - LOV',
model.getType('GKVehicle'))) +
								funcVolume.getVolume(model.getCatalog().findByName('Car - L - HOV',
model.getType('GKVehicle'))) +
								funcVolume.getVolume(model.getCatalog().findByName('Car - M - LOV',
model.getType('GKVehicle'))) +
								funcVolume.getVolume(model.getCatalog().findByName('Car - M - HOV',
model.getType('GKVehicle'))) +
								funcVolume.getVolume(model.getCatalog().findByName('Car - H - LOV',
model.getType('GKVehicle'))) +
								funcVolume.getVolume(model.getCatalog().findByName('Car - H - HOV',
model.getType('GKVehicle'))) )
		# get the truck volume
		truckVolume = funcVolume.getVolume(model.getCatalog().findByName('Truck', model.getType('GKVehicle')))

		# error handling for zero volume
		if (carVolume + truckVolume) > 0:
			truckPercentage = (truckVolume / (carVolume + truckVolume)) * 100
		else:
			truckPercentage = 0
		# return the truck percenage
		return truckPercentage

def vdf(context, section, funcVolume):

		# assign the global variables
		checkExperimentContext(context, section)

		# calculate average section speed in km/hr
		speed = calculateSpeed(context, section, funcVolume)
```

```
        # calculate the truck percentage on this section
        truckPercentage = calculateTruckPercentage(context, section, funcVolume)

        # calculate total cost
        totalCost = travelTime(context, section, funcVolume) + distCost(context, section, funcVolume)

        return totalCost
```

## Volume Delay Function (Connector)

```
def travelTimeConnector(context, connection, funcVolume):

        # work out the time period
        experiment = context.experiment
        scenario = experiment.getScenario()
        trafficDemand = scenario.getDemand()
        duration = trafficDemand.duration()
        durationInHours = duration.toHours()

        #set parameters
        speed = 30.0
        capacity = 200.0 * durationInHours # set to 200 veh/hr, capacity need to be total over three hours
        capacityperlane = 200.0
        JA = 10.0

        volume = funcVolume.getVolume()
        length = connection.length3D()
        totalVolume = volume

        #calculate additional parameters

        X = totalVolume / capacity
        T0 = 1000 / (speed / 3.6) # minimum travel time for section

        #calculate dealy based of the Akcelik delay function

        Tf = 1.0 # Analysis Flow Period, taken as 1 hour
        Rf = (Tf*3600) / T0 # unitless ratio
        #JA = 0.2
        eightX = (8.0 * JA * X ) / (capacityperlane * Tf)

        Time = T0 *( 1 + 0.25*Rf*((X-1.0)+((X-1.0)**2 + eightX)**0.5)) #give seconds per Km

        TotalTravelTime = (Time * (length / 1000))/60

        return TotalTravelTime

def distCostConnector(context, connection, funcVolume):

        '''
        The distance factor adopted from Wellington N2A model
        P:\429\4291565\Technical\300 Technical\320 Models\321 Network Build\N2A_GeneralisedCostDistanceFactor.xlsx

        Assumptions
        Fuel cost                                                       1.75        $/litre
        fuel consumption                                    9.5                     l/100km
        fuel rate                                                       0.16625     $/km
        Assume gc is just fuel cost

        Assumed acg Value of time           16.27       $/hr, 2002 (EEM urban arterial)
        Update factor to 2015                           1.44        EEM
        VoT 2015                                                        23.43       $/hr
        Update factor 2016 estimated 1.01
        VoT 2016 est                                        23.66       $/hr, 2002 (EEM urban arterial)
        Value of time                                       2.536       min/$
        gc of fuel                                                      0.422       mins per km

        Assume 0.4 for Car

        Truck factor was agreed to be 1.0
        '''

        # get the length of the section
        length = connection.length3D()/1000 # length in km

        # factor for the distance component (unit: mins/km)
        className = str(context.userClass.getName())
        dashIndex = className.find(' - ')
        vehName = className[:dashIndex]
        if vehName == "Car" :
                distFactor = 0.5
        elif vehName == "Truck":
                distFactor = 1.0
        else:
                distFactor = 0.0

        # calculate the distance cost
        distanceCost = distFactor * length

        return distanceCost

def vdf(context, connection, funcVolume):
```

```
        # calculate total cost
        totalCost = travelTimeConnector(context, connection, funcVolume) + distCostConnector(context, connection, funcVolume)

        return totalCost
```

## Junction Delay Function

```
def travelTime( context, turn, volume, ownVolume, conflictVolume ):
        model = context.experiment.getModel()
        # work out the time period
        experiment = context.experiment
        scenario = experiment.getScenario()
        trafficDemand = scenario.getDemand()
        duration = trafficDemand.duration()
        durationInHours = duration.toHours()

        #define the peak hour factor based on peak
        # get the experiment
        experiment = context.experiment
        # get the scenario
        scenario = experiment.getScenario()
        # get the traffic demand
        trafficDemand = scenario.getDemand()
        # get the start time of the demand
        startTime = trafficDemand.initialTime()
        # assign peak hour factor based on peak
        # use 1.0 to start adjust as required during calibration - base on observed data
        phfVol = 1.0

        if startTime.hour() == 6:
            phfVol = 1.15
        elif startTime.hour() == 11:
            phfVol = 1.02
        elif startTime.hour() == 15:
            phfVol = 1.05

        # assign travel time factor to reduce peak hour travel time to three hour average travel time
        phfTT = 1.0
        '''
        if startTime.hour() == 6:
            phfTT = 0.6946
        elif startTime.hour() == 11:
            phfTT = 0.8726
        elif startTime.hour() == 15:
            phfTT = 0.7902
        '''
        turnType = model.getType('GKTurning')
        userSlopeColumn = turnType.getColumnByExternalName('Turn Capacity Slope',0)

        #set give-way linear parameters and calculate give-way turn capacity
        Slope = turn.getDataValueDouble(userSlopeColumn)
        Intercept = turn.getCapacity ()
        OpposingFlow = (conflictVolume.getVolume() * phfVol) / durationInHours # AIMSUN return total volume over the time period

        overrides = experiment.getNetworkAttributesOverrides()
        targetId = turn.getId()
        for override in overrides:
            objects = override.getObjects()
            for object in objects:
                    if object.getId() == targetId:
                            for column, value in override.getObjectData(object).iteritems():
                                    if column.getName() == 'GKTurning::capacityAtt':
                                            Intercept = int(value)

        Capacity = (Intercept - Slope * OpposingFlow) # per hour
```

```
		#calculate dealy based of the Akcelik dealy function
		turnFlow = volume.getVolume()
		if Capacity < 50:
			if Intercept < 50:
					Capacity = Intercept
			else:
					Capacity = 50

		X = (turnFlow * phfVol) / (Capacity * durationInHours)
		TurnLength = turn.length3D()
		TurnSpeed = turn.getSpeed()
		T0 = 1
		Tf = 1.0
		Rf = (Tf*3600) / T0
		JA = 1.0 # Curve Parameter
		eightX = 8.0 * JA * X / (Capacity * Tf)

		Time = (T0 *( 1 + 0.25*Rf*((X-1.0)+((X-1.0)**2 + eightX)**0.5)))/60

		return Time * phfTT

def jdf( context, turn, volume, ownVolume, conflictVolume ):

		TT = travelTime( context, turn, volume, ownVolume, conflictVolume )

		#debugging
		#print 'JDF of turn %i with volume of %f and opposing volume of %f calculated the travel time at %f' % (turn.getId(), volume.getVolume(), 
conflictVolume.getVolume(), TT)

		return TT
```

## Turn Delay Function

```
'''
Updated 04/05/2017
From built-in Aimsun 8.2 TPF - Example for Signalized Intersection

Updated 01/08/2017
Refined turn saturation flow to be a function of turn speed
'''
experimentId = None
analysisPeriod = 0.0 # [h]
phfVol = 1.0
phfTT = 1.0

def initialiseContext(context):
		global experimentId
		global analysisPeriod
		global phfVol
		global phfTT
		if context.experiment.getId() != experimentId:
			experimentId = context.experiment.getId()
			analysisPeriod = context.experiment.getScenario().getDemand().duration().toHours()
		#define the peak hour factor based on peak
		# get the experiment
		experiment = context.experiment
		# get the scenario
		scenario = experiment.getScenario()
		# get the traffic demand
		trafficDemand = scenario.getDemand()
		# get the start time of the demand
		startTime = trafficDemand.initialTime()
		# assign peak hour factor based on peak
		phfVol = 1

		if startTime.hour() == 6:
			phfVol = 1.15
		elif startTime.hour() == 10:
```

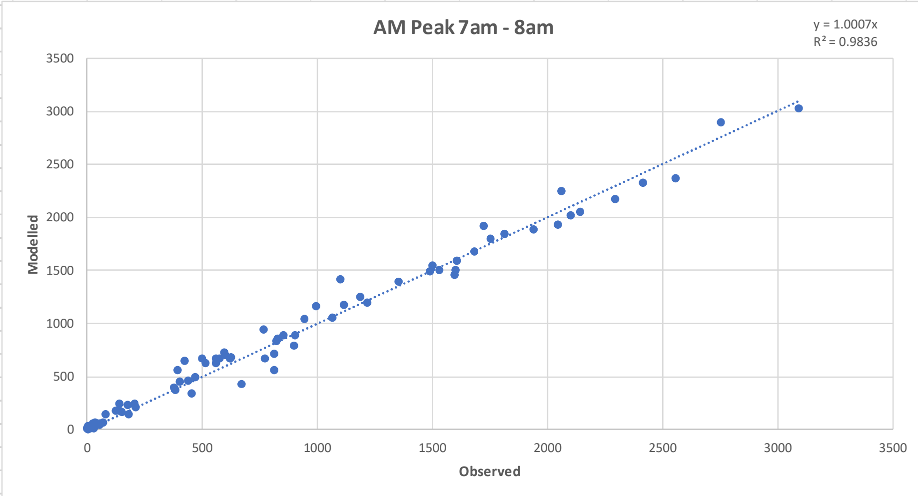
```
            phfVol = 1.02
        elif startTime.hour() == 15:
            phfVol = 1.05

        # assign travel time factor to reduce peak hour travel time to four hour average travel time
        phfTT = 1
        '''
        if startTime.hour() == 6:
            phfTT = 0.6946
        elif startTime.hour() == 10:
            phfTT = 0.8726
        elif startTime.hour() == 15:
            phfTT = 0.7902
        '''
# free flow travel time [min]
def freeFlowTravelTime(turn):
        return turn.length3D()/1000.0 * 60.0/turn.getSpeed()

# actual green duration for actuated phases [s]
# calculated considering the demand and the queue discharge rate
def actualGreen(turn, volume):
        dischargeRate = 0.5 # [veh/s]
        requiredGreen = volume / dischargeRate # [s]
        numberOfCycles = 3600.0 * analysisPeriod / turn.getCycle()
        return min(max(requiredGreen / numberOfCycles, turn.getMinGreenTime()), turn.getMaxGreenTime())

# HCM2010 progression adjustment factor
def progressionAdjustmentFactor(green, cycle):
        g_over_c = green / cycle
        P = min(1.33 * g_over_c, 1.0)
        top_part = (1.0 - P)
        bottom_part = 1.0 - g_over_c
        return top_part / bottom_part

# HCM2010 uniform control delay (quick estimation method) [s]
def uniformControlDelay(volume, capacity, green, cycle):
        g_over_c = green / cycle
        X = (volume * phfVol) / (capacity * analysisPeriod)
        top_part = 0.5 * cycle * (1.0 - g_over_c)**2
        bottom_part = 1.0 - (min(1.0, X) * g_over_c)
        return top_part / bottom_part

# HCM2010 incremental delay (quick estimation method) [s]
def incrementalDelay(volume, capacity):
        X = (volume * phfVol) / (capacity * analysisPeriod)
        return 900.0 * analysisPeriod * ((X - 1.0) + ((X - 1.0)**2 + (4.0 * X / (capacity * analysisPeriod)))**0.5)

# HCM2010 control delay (quick estimation method) [min]
def controlDelay(volume, capacity, green, cycle):
        pf = progressionAdjustmentFactor(green, cycle)
        d_one = uniformControlDelay(volume, capacity, green, cycle)
        d_two = incrementalDelay(volume, capacity)
        res = (pf * d_one) + d_two
        return res / 60.0 * phfTT

def calculateCapacity(turn):
        # get the speed of the turn
        speed = turn.getSpeed()
        # if the speed is less than 50 km/hr
        if speed < 50:
            # calculate saturation flow based on speed
            s = -0.513*speed**2 + 54.81*speed + 553.46
        # else
        else:
            # saturation flow (PCUs/hr)
            s = 2000.0
        # get the turn object as coded (GKTurn)
        turnObject = turn.getMaster()
```

```
        # get the index of the left most lane for this turn
        leftMostLanes = turnObject.getOriginFromLane()
        # get the index of the right most lane for this turn
        rightMostLanes = turnObject.getOriginToLane()
        # calculate number of lanes
        lanes = rightMostLanes - leftMostLanes + 1
        #  the capacity is saturation flow * lanes * green / cycle
        capacity = s * lanes * (turn.getGreenTime() / turn.getCycle())

        return capacity

def tpf(context, turn, volume):
        initialiseContext(context)
        res = freeFlowTravelTime(turn)
        if turn.getCycle() > 0.0:
            green = turn.getGreenTime()
            if turn.getControlJunctionType() == 4: # actuated
                    green = actualGreen(turn, volume.getVolume())
            # error handling for 0 green time in control plan for this turn
            if green > 0:
                    if green < turn.getCycle():
                            res += controlDelay(volume.getVolume(), calculateCapacity(turn), green, turn.getCycle())
            else:
                    print 'turn %u in node %u has no green time in the control plan used' % (turn.getMaster().getId(), turn.getMaster().getNode().getId())
        return res
```

Appendix H

# Count Validation Tables

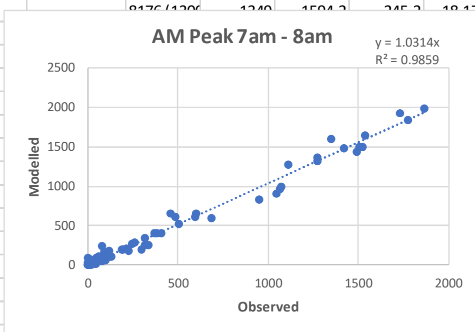
| Object | Count - Li | Count - Av | Absolute | Relative D | GEH | 10.0166 | Diff^2 | Obs/N |
|---|---|---|---|---|---|---|---|---|
| 11897 | 670 | 434.6 | -235.4 | -35.1343 | 10.0166 | | 55413.16 | 8.170732 |
| 7732 | 816 | 557 | -259 | -31.7402 | 9.88506 | | 67081 | 9.95122 |
| 16548 | 424 | 652.8 | 228.8 | 53.9623 | 9.8606 | | 52349.44 | 5.170732 |
| 12210502 | 1100 | 1413 | 313 | 28.4545 | 8.83005 | | 97969 | 13.41463 |
| 16517 | 393 | 559.8 | 166.8 | 42.4427 | 7.64206 | | 27822.24 | 4.792683 |
| 7276 | 144 | 247.2 | 103.2 | 71.6667 | 7.37896 | | 10650.24 | 1.756098 |
| 7400 | 500 | 667.2 | 167.2 | 33.44 | 6.92116 | | 27955.84 | 6.097561 |
| 12210282 | 770 | 946.8 | 176.8 | 22.961 | 6.03445 | | 31258.24 | 9.390244 |
| 7104 | 81 | 143.6 | 62.6 | 77.284 | 5.90724 | | 3918.76 | 0.987805 |
| 7228 | 8 | 34 | 26 | 325 | 5.67367 | | 676 | 0.097561 |
| 7166 | 457 | 347.8 | -109.2 | -23.895 | 5.44369 | | 11924.64 | 5.573171 |
| 12210663 | 994 | 1160.6 | 166.6 | 16.7606 | 5.07583 | | 27755.56 | 12.12195 |
| 15953 | 599 | 721.6 | 122.6 | 20.4674 | 4.77111 | | 15030.76 | 7.304878 |
| 7074 | 1721 | 1923.8 | 202.8 | 11.7838 | 4.75057 | | 41127.84 | 20.9878 |
| 7092 | 25 | 54 | 29 | 116 | 4.61423 | | 841 | 0.304878 |
| 12870 | 518 | 626 | 108 | 20.8494 | 4.51571 | | 11664 | 6.317073 |
| 12211719 | 563 | 668.8 | 105.8 | 18.7922 | 4.26315 | | 11193.64 | 6.865854 |
| 7438 | 38 | 69 | 31 | 81.5789 | 4.23823 | | 961 | 0.463415 |
| 12210270 | 2 | 13.8 | 11.8 | 590 | 4.19825 | | 139.24 | 0.02439 |
| 7210 | 177 | 234.8 | 57.8 | 32.6554 | 4.02809 | | 3340.84 | 2.158537 |
| 7042 | 2064 | 2249.4 | 185.4 | 8.98256 | 3.99222 | | 34373.16 | 25.17073 |
| 7274 | 2557 | 2365.2 | -191.8 | -7.50098 | 3.8662 | | 36787.24 | 31.18293 |
| 7410 | 127 | 174.2 | 47.2 | 37.1654 | 3.84618 | | 2227.84 | 1.54878 |
| 7222 | 603 | 701.2 | 98.2 | 16.2852 | 3.84551 | | 9643.24 | 7.353659 |
| 12211551 | 772 | 672.4 | -99.6 | -12.9016 | 3.70621 | | 9920.16 | 9.414634 |
| 12211562 | 579 | 670.2 | 91.2 | 15.7513 | 3.64917 | | 8317.44 | 7.060976 |
| 7524 | 901 | 797.2 | -103.8 | -11.5205 | 3.5622 | | 10774.44 | 10.9878 |
| 7192 | 816 | 719.2 | -96.8 | -11.8627 | 3.49388 | | 9370.24 | 9.95122 |
| 17220 | 30 | 52.2 | 22.2 | 74 | 3.46284 | | 492.84 | 0.365854 |
| 12211622 | 1597 | 1465.4 | -131.6 | -8.24045 | 3.3631 | | 17318.56 | 19.47561 |
| 7730 | 184 | 143.2 | -40.8 | -22.1739 | 3.18984 | | 1664.64 | 2.243902 |
| 7724 | 947 | 1045.8 | 98.8 | 10.4329 | 3.12997 | | 9761.44 | 11.54878 |
| 7140 | 142 | 180.2 | 38.2 | 26.9014 | 3.00965 | | 1459.24 | 1.731707 |
| 13643 | 2753 | 2901.8 | 148.8 | 5.40501 | 2.7984 | | 22141.44 | 33.57317 |
| 15596 | 563 | 628.8 | 65.8 | 11.6874 | 2.6955 | | 4329.64 | 6.865854 |
| 7220 | 2295 | 2174 | -121 | -5.27233 | 2.55974 | | 14641 | 27.9878 |
| 7126 | 30 | 17.6 | -12.4 | -41.3333 | 2.54175 | | 153.76 | 0.365854 |
| 7390 | 1601 | 1501 | -100 | -6.2461 | 2.53918 | | 10000 | 19.52439 |
| 15955 | 2048 | 1936.4 | -111.6 | -5.44922 | 2.50033 | | 12454.56 | 24.97561 |
| 12211544 | 406 | 454.2 | 48.2 | 11.8719 | 2.32414 | | 2323.24 | 4.95122 |
| 7540 | 208 | 238.6 | 30.6 | 14.7115 | 2.04775 | | 936.36 | 2.536585 |
| 7442 | 210 | 240.2 | 30.2 | 14.381 | 2.01289 | | 912.04 | 2.560976 |
| 7356 | 629 | 679.4 | 50.4 | 8.01272 | 1.97049 | | 2540.16 | 7.670732 |
| 7428 | 1187 | 1254.8 | 67.8 | 5.71188 | 1.94039 | | 4596.84 | 14.47561 |
| 7180 | 1115 | 1178.6 | 63.6 | 5.70404 | 1.87808 | | 4044.96 | 13.59756 |
| 7240 | 2141 | 2055 | -86 | -4.01681 | 1.87757 | | 7396 | 26.10976 |
| 6920 | 621 | 667 | 46 | 7.40741 | 1.81265 | | 2116 | 7.573171 |
| 7532 | 2104 | 2023 | -81 | -3.84981 | 1.78313 | | 6561 | 25.65854 |
| 16027 | 2417 | 2331.8 | -85.2 | -3.52503 | 1.74849 | | 7259.04 | 29.47561 |
| 12211629 | 4 | 1.2 | -2.8 | -70 | 1.73649 | | 7.84 | 0.04878 |
| 7066 | 56 | 46.2 | -9.8 | -17.5 | 1.37093 | | 96.04 | 0.682927 |
| 7118 | 1941 | 1883 | -58 | -2.98815 | 1.32643 | | 3364 | 23.67073 |
| 12210676 | 18 | 12.8 | -5.2 | -28.8889 | 1.32508 | | 27.04 | 0.219512 |
| 12210661 | 855 | 894 | 39 | 4.5614 | 1.31882 | | 1521 | 10.42683 |
| 12211631 | 23 | 29.4 | 6.4 | 27.8261 | 1.25034 | | 40.96 | 0.280488 |
| 7036 | 47 | 55.8 | 8.8 | 18.7234 | 1.22744 | | 77.44 | 0.573171 |
| 6964 | 3093 | 3026.2 | -66.8 | -2.15972 | 1.20766 | | 4462.24 | 37.71951 |
| 12152 | 1501 | 1547.8 | 46.8 | 3.11792 | 1.19866 | | 2190.24 | 18.30488 |
| 6962 | 831 | 862.2 | 31.2 | 3.75451 | 1.0723 | | 973.44 | 10.13415 |
| 6940 | 468 | 491.4 | 23.4 | 5 | 1.06839 | | 547.56 | 5.707317 |
| 12210262 | 1357 | 1396.6 | 39.6 | 2.9182 | 1.06723 | | 1568.16 | 16.54878 |
| 12210650 | 440 | 461 | 21 | 4.77273 | 0.9894 | | 441 | 5.365854 |
| 7164 | 152 | 164.4 | 12.4 | 8.15789 | 0.985867 | | 153.76 | 1.853659 |
| 12210320 | 1756 | 1795.8 | 39.8 | 2.26651 | 0.944439 | | 1584.04 | 21.41463 |
| 7106 | 831 | 856 | 25 | 3.00842 | 0.86079 | | 625 | 10.13415 |
| 7116 | 1814 | 1845.8 | 31.8 | 1.75303 | 0.743384 | | 1011.24 | 22.12195 |
| 12210514 | 379 | 392.8 | 13.8 | 3.64116 | 0.702493 | | 190.44 | 4.621951 |
| 7040 | 57 | 62.2 | 5.2 | 9.12281 | 0.673566 | | 27.04 | 0.695122 |
| 12126 | 1530 | 1504 | -26 | -1.69935 | 0.667545 | | 676 | 18.65854 |
| 17011 | 72 | 67.2 | -4.8 | -6.66667 | 0.575356 | | 23.04 | 0.878049 |
| 16525 | 1220 | 1200.2 | -19.8 | -1.62295 | 0.569186 | | 392.04 | 14.87805 |
| 12210516 | 383 | 372.8 | -10.2 | -2.66319 | 0.524701 | | 104.04 | 4.670732 |
| 10618 | 1608 | 1588.4 | -19.6 | -1.21891 | 0.490276 | | 384.16 | 19.60976 |
| 16119 | 903 | 889.4 | -13.6 | -1.50609 | 0.454293 | | 184.96 | 11.0122 |
| 7408 | 1065 | 1052.2 | -12.8 | -1.20188 | 0.393409 | | 163.84 | 12.9878 |
| 7214 | 38 | 36.2 | -1.8 | -4.73684 | 0.295519 | | 3.24 | 0.463415 |
| 7254 | 212 | 208 | -4 | -1.88679 | 0.276026 | | 16 | 2.585366 |
| 12211564 | 24 | 22.8 | -1.2 | -5 | 0.248069 | | 1.44 | 0.292683 |
| 12155 | 1683 | 1678.2 | -4.8 | -0.28521 | 0.117087 | | 23.04 | 20.52439 |
| 7172 | 1489 | 1490 | 1 | 0.067159 | 0.025911 | | 1 | 18.15854 |
| 7098 | 28 | 28 | 0 | 0 | 0 | | 0 | 0.341463 |
| 12211534 | 25 | 25 | 0 | 0 | 0 | | 0 | 0.304878 |
| Mean | 823.78 | 841.234 | 17.4537 | 2.11873 | | | | |



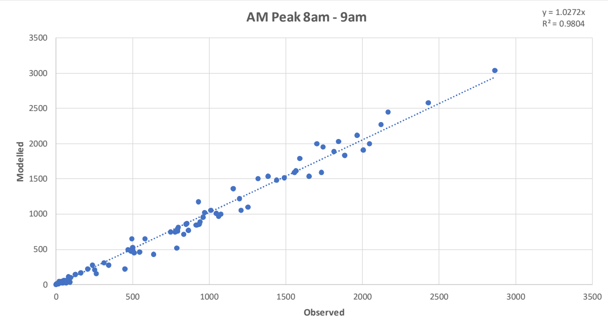

| | Link | |
|---|---|---|
| | <5 | 85% |
| | <7.5 | 94% |
| | <10 | 99% |
| 82 | RMSE | 12% |

| | Turn | |
|---|---|---|
| | <5 | 84% |
| | <7.5 | 93% |
| | <10 | 96% |
| 80 | RMSE | 19% |

| | Object | Count - Li | Count - Av | Absolute | Relative D | GEH | | Diff^2 | Obs/N |
|---|---|---|---|---|---|---|---|---|---|
| Data issue? | 13284072 ( | 2 | 93.6 | 91.6 | 4580 | 13.249 | | 8390.56 | 0.02439 |
| Rat running | 8062 (3315 | 81 | 236.4 | 155.4 | 191.852 | 12.3357 | | 24149.16 | 0.987805 |
| | 13284134 ( | 6 | 72.4 | 66.4 | 1106.67 | 10.6054 | | 4408.96 | 0.073171 |
| | 13284124 ( | 9 | 68.8 | 59.8 | 664.444 | 9.58796 | | 3576.04 | 0.109756 |
| | 8218 (3310 | 0 | 38.6 | 38.6 | inf | 8.78635 | | 1489.96 | 0 |
| | 8308 (1300 | 462 | 651.8 | 189.8 | 41.0823 | 8.04281 | | 36024.04 | 5.634146 |
| | 13284092 ( | 91.6667 | 164.8 | 73.1333 | 79.7818 | 6.45825 | | 5348.48 | 1.117887 |
| | 8176 (1300 | 1349 | 1594.2 | 245.2 | 18.1764 | 6.39184 | | 60123.04 | 16.45122 |
| | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | 6.15486 | | 9447.84 | 3.634146 |
| | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | 5.96803 | | 2621.44 | 0.585366 |
| | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | 5.4066 | | 16027.56 | 5.914634 |
| | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | 5.30801 | | 4147.36 | 1.402439 |
| | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | 5.20633 | | 2304 | 0.743902 |
| | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | 4.89065 | | 6988.96 | 4.073171 |
| | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | 4.75553 | | 22022.56 | 12.78049 |
| | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | 4.7224 | | 432.64 | 0.109756 |
| | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | 4.6766 | | 1797.76 | 0.743902 |
| | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | 4.61863 | | 38966.76 | 21.07317 |
| | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | 4.5091 | | 24211.36 | 13.57317 |
| | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | 4.35465 | | 1024 | 0.463415 |
| | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | 4.2883 | | 1971.36 | 1.036585 |
| | 8060 (3310 | 11 | 30.4 | 19.4 | 176.364 | 4.26399 | | 376.36 | 0.134146 |
| | 8200 (3202 | 47 | 22.2 | -24.8 | -52.766 | 4.21613 | | 615.04 | 0.573171 |
| | 12426 (130 | 38 | 16.8 | -21.2 | -55.7895 | 4.05005 | | 449.44 | 0.463415 |
| | 13284070 ( | 947 | 827.8 | -119.2 | -12.5871 | 4.00144 | | 14208.64 | 11.54878 |
| | 13284113 ( | 8 | 0 | -8 | -100 | 4 | | 64 | 0.097561 |
| | 8170 (3202 | 320 | 252.4 | -67.6 | -21.125 | 3.99587 | | 4569.76 | 3.902439 |
| | 13284126 ( | 97 | 62.8 | -34.2 | -35.2577 | 3.82607 | | 1169.64 | 1.182927 |
| | 13284095 ( | 6.33333 | 20 | 13.6667 | 215.789 | 3.76638 | | 186.7787 | 0.077236 |
| | 8320 (1300 | 31 | 55.6 | 24.6 | 79.3548 | 3.73845 | | 605.16 | 0.378049 |
| | 8312 (1300 | 43 | 69.8 | 26.8 | 62.3256 | 3.56858 | | 718.24 | 0.52439 |
| | 13284135 ( | 682 | 595 | -87 | -12.7566 | 3.44301 | | 7569 | 8.317073 |
| | 13284125 ( | 1069 | 968.2 | -100.8 | -9.42937 | 3.15834 | | 10160.64 | 13.03659 |
| | 8318 (1300 | 23 | 11.6 | -11.4 | -49.5652 | 2.74083 | | 129.96 | 0.280488 |
| | 13562 (340 | 228 | 188.6 | -39.4 | -17.2807 | 2.72993 | | 1552.36 | 2.780488 |
| | 13284123 ( | 76 | 55 | -21 | -27.6316 | 2.59477 | | 441 | 0.926829 |
| | 13284068 ( | 1272 | 1364 | 92 | 7.2327 | 2.53414 | | 8464 | 15.5122 |
| | 8182 (1300 | 1539 | 1639.6 | 100.6 | 6.53671 | 2.52345 | | 10120.36 | 18.76829 |
| | 8050 (3300 | 1866 | 1975.8 | 109.8 | 5.88424 | 2.50524 | | 12056.04 | 22.7561 |
| | 8228 (3300 | 1070 | 991.4 | -78.6 | -7.34579 | 2.44825 | | 6177.96 | 13.04878 |
| | 13564 (340 | 599 | 660.2 | 61.2 | 10.217 | 2.43904 | | 3745.44 | 7.304878 |
| | 8238 (3315 | 15 | 25.6 | 10.6 | 70.6667 | 2.35265 | | 112.36 | 0.182927 |
| | 13284112 ( | 2 | 0 | -2 | -100 | 2 | | 4 | 0.02439 |
| | 13284130 ( | 245 | 274.6 | 29.6 | 12.0816 | 1.83642 | | 876.16 | 2.987805 |
| | 13563 (340 | 127 | 107.2 | -19.8 | -15.5906 | 1.82973 | | 392.04 | 1.54878 |
| | 8316 (1300 | 370 | 405.8 | 35.8 | 9.67568 | 1.8177 | | 1281.64 | 4.512195 |
| | 8210 (1800 | 1418 | 1482.2 | 64.2 | 4.5275 | 1.68592 | | 4121.64 | 17.29268 |
| | 8056 (3300 | 15 | 22.2 | 7.2 | 48 | 1.66946 | | 51.84 | 0.182927 |
| | 8184 (1300 | 25 | 17.6 | -7.4 | -29.6 | 1.6034 | | 54.76 | 0.304878 |
| | 13284096 ( | 2 | 4.8 | 2.8 | 140 | 1.51851 | | 7.84 | 0.02439 |
| | 8208 (1800 | 1493 | 1435.2 | -57.8 | -3.8714 | 1.51058 | | 3340.84 | 18.20732 |
| | 8212 (1800 | 54 | 65.6 | 11.6 | 21.4815 | 1.50006 | | 134.56 | 0.658537 |
| | 13284121 ( | 261 | 285.8 | 24.8 | 9.50192 | 1.49987 | | 615.04 | 3.182927 |
| | 13284093 ( | 1 | 0 | -1 | -100 | 1.41421 | | 1 | 0.012195 |
| | 13284109 ( | 1 | 0 | -1 | -100 | 1.41421 | | 1 | 0.012195 |
| | 13284132 ( | 100 | 86.8 | -13.2 | -13.2 | 1.36584 | | 174.24 | 1.219512 |
| | 12425 (130 | 1777 | 1832.6 | 55.6 | 3.12887 | 1.30876 | | 3091.36 | 21.67073 |
| | 10379 (330 | 1272 | 1318.8 | 46.8 | 3.67925 | 1.3003 | | 2190.24 | 15.5122 |
| | 12404 (130 | 31 | 38.6 | 7.6 | 24.5161 | 1.28832 | | 57.76 | 0.378049 |
| | 10376 (330 | 316 | 338.6 | 22.6 | 7.1519 | 1.24921 | | 510.76 | 3.853659 |
| | 8224 (3315 | 2.33333 | 0.8 | -1.53333 | -65.7143 | 1.22503 | | 2.351101 | 0.028455 |
| | 13566 (340 | 25 | 31 | 6 | 24 | 1.13389 | | 36 | 0.304878 |
| | 8232 (3310 | 6 | 3.6 | -2.4 | -40 | 1.09545 | | 5.76 | 0.073171 |
| | 8236 (3302 | 11 | 8 | -3 | -27.2727 | 0.973329 | | 9 | 0.134146 |
| | 13284069 ( | 26 | 30.4 | 4.4 | 16.9231 | 0.828568 | | 19.36 | 0.317073 |
| | 12423 (130 | 54 | 60 | 6 | 11.1111 | 0.794719 | | 36 | 0.658537 |
| | 8240 (3300 | 36 | 31.4 | -4.6 | -12.7778 | 0.792397 | | 21.16 | 0.439024 |
| | 13284131 ( | 10 | 7.8 | -2.2 | -22 | 0.737442 | | 4.84 | 0.121951 |
| | 13284097 ( | 0.666667 | 0.2 | -0.46667 | -70 | 0.708918 | | 0.217778 | 0.00813 |
| | 10374 (330 | 115 | 107.8 | -7.2 | -6.26087 | 0.682166 | | 51.84 | 1.402439 |
| | 12118 | 1527 | 1502.4 | -24.6 | -1.611 | 0.63208 | | 605.16 | 18.62195 |
| | 10378 (331 | 503 | 514 | 11 | 2.18688 | 0.487806 | | 121 | 6.134146 |
| | 13284133 ( | 408 | 399.8 | -8.2 | -2.0098 | 0.408016 | | 67.24 | 4.97561 |
| | 8260 (3200 | 1505 | 1490.6 | -14.4 | -0.95681 | 0.372079 | | 207.36 | 18.35366 |
| | 10377 (330 | 597 | 605 | 8 | 1.34003 | 0.326327 | | 64 | 7.280488 |
| | 13554 | 211 | 207.8 | -3.2 | -1.51659 | 0.221137 | | 10.24 | 2.573171 |
| | 13284071 ( | 191 | 194 | 3 | 1.57068 | 0.216225 | | 9 | 2.329268 |
| | 13284073 ( | 196 | 194 | -2 | -1.02041 | 0.143223 | | 4 | 2.390244 |
| | 13284108 ( | 0 | 0 | 0 | 0 | 0 | | 0 | 0 |
| | 13284110 ( | 0 | 0 | 0 | 0 | 0 | | 0 | 0 |
| | Mean | 379.313 | 396.687 | 17.375 | 4.58066 | | | | |

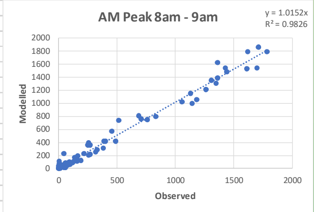


| Object | Count - Li | Count - Av | Absolute | Relative D | GEH | 12.4186 | Diff^2 | Obs/N |
|---|---|---|---|---|---|---|---|---|
| 7540 | 449 | 221.6 | -227.4 | -50.6459 | 12.4186 | | 51710.76 | 5.47561 |
| 7732 | 791 | 513.2 | -277.8 | -35.1201 | 10.8787 | | 77172.84 | 9.646341 |
| 11897 | 638 | 432.2 | -205.8 | -32.2571 | 8.89668 | | 42353.64 | 7.780488 |
| 12210663 | 928 | 1174.8 | 246.8 | 26.5948 | 7.61134 | | 60910.24 | 11.31707 |
| 7098 | 68 | 19.8 | -48.2 | -70.8824 | 7.27469 | | 2323.24 | 0.829268 |
| 7730 | 264 | 160.6 | -103.4 | -39.1667 | 7.09652 | | 10691.56 | 3.219512 |
| 7240 | 1703 | 1994 | 291 | 17.0875 | 6.76836 | | 84681 | 20.76829 |
| 7066 | 91 | 39 | -52 | -57.1429 | 6.44981 | | 2704 | 1.109756 |
| 16548 | 497 | 649 | 152 | 30.5835 | 6.34989 | | 23104 | 6.060976 |
| 12210502 | 1157 | 1364.2 | 207.2 | 17.9084 | 5.83581 | | 42931.84 | 14.10976 |
| 7274 | 2168 | 2446.4 | 278.4 | 12.8413 | 5.79598 | | 77506.56 | 26.43902 |
| 12210262 | 1319 | 1507.6 | 188.6 | 14.2987 | 5.01677 | | 35569.96 | 16.08537 |
| 12210320 | 1743 | 1954.6 | 211.6 | 12.14 | 4.9212 | | 44774.56 | 21.2561 |
| 7074 | 1592 | 1786.4 | 194.4 | 12.2111 | 4.72994 | | 37791.36 | 19.41463 |
| 7228 | 22 | 50 | 28 | 127.273 | 4.66667 | | 784 | 0.268293 |
| 12210661 | 1209 | 1057.4 | -151.6 | -12.5393 | 4.50346 | | 22982.56 | 14.7439 |
| 16525 | 1253 | 1104.6 | -148.4 | -11.8436 | 4.32229 | | 22022.56 | 15.28049 |
| 7042 | 1844 | 2032.2 | 188.2 | 10.2061 | 4.27495 | | 35419.24 | 22.4878 |
| 12211551 | 836 | 717.6 | -118.4 | -14.1627 | 4.24812 | | 14018.56 | 10.19512 |
| 7390 | 1387 | 1535.2 | 148.2 | 10.6849 | 3.87711 | | 21963.24 | 16.91463 |
| 7126 | 48 | 25 | -23 | -47.9167 | 3.80699 | | 529 | 0.585366 |
| 17220 | 41 | 20 | -21 | -51.2195 | 3.8025 | | 441 | 0.5 |
| 12210270 | 4 | 15.8 | 11.8 | 295 | 3.75029 | | 139.24 | 0.04878 |
| 7254 | 346 | 280.2 | -65.8 | -19.0173 | 3.71864 | | 4329.64 | 4.219512 |
| 7036 | 59 | 34 | -25 | -42.3729 | 3.66618 | | 625 | 0.719512 |
| 7104 | 81 | 117.2 | 36.2 | 44.6914 | 3.6364 | | 1310.44 | 0.987805 |
| 12210514 | 546 | 465.8 | -80.2 | -14.6886 | 3.56568 | | 6432.04 | 6.658537 |
| 12152 | 1732 | 1593.6 | -138.4 | -7.99076 | 3.39403 | | 19154.56 | 21.12195 |
| 7220 | 1968 | 2120.2 | 152.2 | 7.73374 | 3.36638 | | 23164.84 | 24 |
| 15596 | 862 | 767.2 | -94.8 | -10.9977 | 3.32151 | | 8987.04 | 10.5122 |
| 16027 | 2123 | 2276.6 | 153.6 | 7.23504 | 3.27491 | | 23592.96 | 25.89024 |
| 6964 | 2867 | 3038.6 | 171.6 | 5.98535 | 3.15791 | | 29446.56 | 34.96341 |
| 7164 | 255 | 207.6 | -47.4 | -18.5882 | 3.11667 | | 2246.76 | 3.109756 |
| 12210516 | 512 | 447.6 | -64.4 | -12.5781 | 2.94006 | | 4147.36 | 6.243902 |
| 7172 | 1653 | 1537.4 | -115.6 | -6.99335 | 2.89434 | | 13363.36 | 20.15854 |
| 6962 | 1060 | 968 | -92 | -8.67925 | 2.88914 | | 8464 | 12.92683 |
| 13643 | 2430 | 2573.6 | 143.6 | 5.90947 | 2.87097 | | 20620.96 | 29.63415 |
| 12870 | 581 | 649.6 | 68.6 | 11.8072 | 2.76554 | | 4705.96 | 7.085366 |
| 7222 | 919 | 846.6 | -72.4 | -7.87813 | 2.43673 | | 5241.76 | 11.20732 |
| 15953 | 935 | 862.8 | -72.2 | -7.72193 | 2.40814 | | 5212.84 | 11.40244 |
| 7276 | 239 | 277.4 | 38.4 | 16.0669 | 2.38975 | | 1474.56 | 2.914634 |
| 7408 | 1077 | 1004.2 | -72.8 | -6.75952 | 2.25678 | | 5299.84 | 13.13415 |
| 7106 | 916 | 849.6 | -66.4 | -7.24891 | 2.23479 | | 4408.96 | 11.17073 |
| 7116 | 2006 | 1909.4 | -96.6 | -4.81555 | 2.18325 | | 9331.56 | 24.46341 |
| 15955 | 1812 | 1890.2 | 78.2 | 4.31567 | 1.81757 | | 6115.24 | 22.09756 |
| 7040 | 73 | 59 | -14 | -19.1781 | 1.72328 | | 196 | 0.890244 |
| 7140 | 127 | 147 | 20 | 15.748 | 1.70872 | | 400 | 1.54878 |
| 7092 | 34 | 44.4 | 10.4 | 30.5882 | 1.66108 | | 108.16 | 0.414634 |
| 7180 | 969 | 1020.2 | 51.2 | 5.2838 | 1.62348 | | 2621.44 | 11.81707 |
| 12211631 | 24 | 32.4 | 8.4 | 35 | 1.58181 | | 70.56 | 0.292683 |
| 16517 | 499 | 534.8 | 35.8 | 7.17435 | 1.57463 | | 1281.64 | 6.085366 |
| 7356 | 940 | 892.6 | -47.4 | -5.04255 | 1.56588 | | 2246.76 | 11.46341 |
| 12211562 | 796 | 754.6 | -41.4 | -5.20101 | 1.48684 | | 1713.96 | 9.707317 |
| 7724 | 1010 | 1055.8 | 45.8 | 4.53465 | 1.42507 | | 2097.64 | 12.31707 |
| 6940 | 470 | 501.4 | 31.4 | 6.68085 | 1.42477 | | 985.96 | 5.731707 |
| 10618 | 1565 | 1618.8 | 53.8 | 3.4377 | 1.34842 | | 2894.44 | 19.08537 |
| 7118 | 1884 | 1831.8 | -52.2 | -2.7707 | 1.21104 | | 2724.84 | 22.97561 |
| 7438 | 53 | 61.8 | 8.8 | 16.6038 | 1.16152 | | 77.44 | 0.646341 |
| 16119 | 1045 | 1008.6 | -36.4 | -3.48325 | 1.13595 | | 1324.96 | 12.7439 |
| 7532 | 2045 | 1994.6 | -50.4 | -2.46455 | 1.12144 | | 2540.16 | 24.93902 |
| 12210650 | 493 | 469.6 | -23.4 | -4.74645 | 1.06662 | | 547.56 | 6.012195 |
| 12211719 | 778 | 749.2 | -28.8 | -3.7018 | 1.04222 | | 829.44 | 9.487805 |
| 12126 | 1442 | 1479.4 | 37.4 | 2.59362 | 0.978568 | | 1398.76 | 17.58537 |
| 7210 | 209 | 222.6 | 13.6 | 6.50718 | 0.925791 | | 184.96 | 2.54878 |
| 12155 | 1558 | 1593.2 | 35.2 | 2.25931 | 0.886788 | | 1239.04 | 19 |
| 12211629 | 3 | 1.8 | -1.2 | -40 | 0.774597 | | 1.44 | 0.036585 |
| 12211622 | 1489 | 1517.4 | 28.4 | 1.90732 | 0.732504 | | 806.56 | 18.15854 |
| 12211534 | 27 | 30.8 | 3.8 | 14.0741 | 0.706862 | | 14.44 | 0.329268 |
| 7410 | 162 | 170.8 | 8.8 | 5.4321 | 0.682191 | | 77.44 | 1.97561 |
| 7400 | 854 | 874 | 20 | 2.34192 | 0.680414 | | 400 | 10.41463 |
| 7428 | 1199 | 1214.4 | 15.4 | 1.2844 | 0.443324 | | 237.16 | 14.62195 |
| 7192 | 798 | 810.4 | 12.4 | 1.55388 | 0.43726 | | 153.76 | 9.731707 |
| 7166 | 502 | 493.4 | -8.6 | -1.71315 | 0.385491 | | 73.96 | 6.121951 |
| 12211564 | 24 | 22.2 | -1.8 | -7.5 | 0.374513 | | 3.24 | 0.292683 |
| 12210676 | 17 | 15.6 | -1.4 | -8.23529 | 0.346764 | | 1.96 | 0.207317 |
| 17011 | 98 | 101.2 | 3.2 | 3.26531 | 0.320642 | | 10.24 | 1.195122 |
| 7442 | 312 | 315.6 | 3.6 | 1.15385 | 0.203224 | | 12.96 | 3.804878 |
| 6920 | 749 | 744.2 | -4.8 | -0.64085 | 0.17567 | | 23.04 | 9.134146 |
| 7524 | 792 | 787.4 | -4.6 | -0.58081 | 0.163692 | | 21.16 | 9.658537 |
| 12210282 | 960 | 955.6 | -4.4 | -0.45833 | 0.142172 | | 19.36 | 11.70732 |
| 7214 | 58 | 57.4 | -0.6 | -1.03448 | 0.078988 | | 0.36 | 0.707317 |
| 12211544 | 496 | 495 | -1 | -0.20161 | 0.044924 | | 1 | 6.04878 |
| Mean | 848.598 | 856.312 | 7.71463 | 0.909104 | | | | |



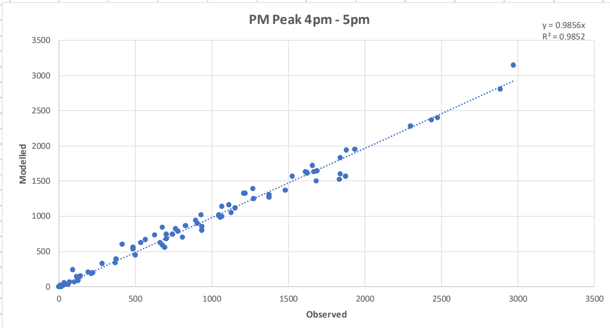

| | Link | |
|---|---|---|
| | <5 | 85% |
| | <7.5 | 95% |
| | <10 | 98% |
| 82 | RMSE | 13% |

| | Turn | |
|---|---|---|
| | <5 | 85% |
| | <7.5 | 91% |
| | <10 | 98% |
| 80 | RMSE | 19% |



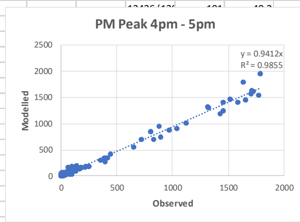

| | Object | Count - Li | Count - Av | Absolute | Relative D | GEH | | Diff^2 | Obs/N |
|---|---|---|---|---|---|---|---|---|---|
| Rat running | 8062 (331 | 47 | 233.2 | 186.2 | 396.17 | 15.7312 | | 34670.44 | 0.573171 |
| Data issue? | 13284072 ( | 8 | 115 | 107 | 1337.5 | 13.6441 | | 11449 | 0.097561 |
| | 13284134 ( | 10 | 75.2 | 65.2 | 652 | 9.98948 | | 4251.04 | 0.121951 |
| | 13564 (34( | 514 | 736.6 | 222.6 | 43.3074 | 8.90186 | | 49550.76 | 6.268293 |
| | 13284124 ( | 16 | 70.4 | 54.4 | 340 | 8.2767 | | 2959.36 | 0.195122 |
| | 8218 (331( | 2 | 36.2 | 34.2 | 1710 | 7.82545 | | 1169.64 | 0.02439 |
| | 10376 (33( | 260 | 399.2 | 139.2 | 53.5385 | 7.66736 | | 19376.64 | 3.170732 |
| | 12426 (13( | 63 | 16 | -47 | -74.6032 | 7.47824 | | 2209 | 0.768293 |
| | 8176 (130( | 1360 | 1619 | 259 | 19.0441 | 6.71088 | | 67081 | 16.58537 |
| | | | | | | 6.03708 | | 11025 | 3.04878 |
| | | | | | | 5.23414 | | 4356 | 2.341463 |
| | | | | | | 5.14151 | | 13595.56 | 5.560976 |
| | | | | | | 4.90774 | | 852.64 | 0.609756 |
| | | | | | | 4.73587 | | 7089.64 | 3.341463 |
| | | | | | | 4.69042 | | 121 | 0.134146 |
| | | | | | | 4.67844 | | 23409 | 13.97561 |
| | | | | | | 4.58382 | | 15775.36 | 8.390244 |
| | | | | | | 4.13811 | | 2342.56 | 1.963415 |
| | | | | | | 4.05032 | | 1296 | 1.182927 |
| | | | | | | 3.98401 | | 25664.04 | 20.69512 |
| | | | | | | 3.97285 | | 26830.44 | 19.73171 |
| | | | | | | 3.79991 | | 217.0701 | 0.093496 |
| | | | | | | 3.72853 | | 3969 | 3.865854 |
| | 8206 (180( | 61 | 93.4 | 32.4 | 53.1148 | 3.68754 | | 1049.76 | 0.743902 |
| | 8228 (330( | 1183 | 1060.4 | -122.6 | -10.3635 | 3.6606 | | 15030.76 | 14.42683 |
| | 8170 (320 | 381 | 313 | -68 | -17.8478 | 3.65043 | | 4624 | 4.646341 |
| | 8240 (330( | 65 | 39.2 | -25.8 | -39.6923 | 3.57438 | | 665.64 | 0.792683 |
| | 13284132 ( | 120 | 84.2 | -35.8 | -29.8333 | 3.54299 | | 1281.64 | 1.463415 |
| | 8314 (130( | 1713 | 1859.8 | 146.8 | 8.56976 | 3.47326 | | 21550.24 | 20.89024 |
| | 13284108 ( | 6 | 0 | -6 | -100 | 3.4641 | | 36 | 0.073171 |
| | 10374 (33( | 169 | 127.2 | -41.8 | -24.7337 | 3.43478 | | 1747.24 | 2.060976 |
| | 13284133 ( | 488 | 415.8 | -72.2 | -14.7951 | 3.39638 | | 5212.84 | 5.95122 |
| | 10375 (33 | 15 | 30.8 | 15.8 | 105.333 | 3.30171 | | 249.64 | 0.182927 |
| | 13554 | 271 | 220.2 | -50.8 | -18.7454 | 3.24153 | | 2580.64 | 3.304878 |
| | 8224 (331 | 5.33333 | 0.2 | -5.13333 | -96.25 | 3.08618 | | 26.35108 | 0.065041 |
| | 13284073 ( | 255 | 209.6 | -45.4 | -17.8039 | 2.97873 | | 2061.16 | 3.109756 |
| | 8182 (130( | 1425 | 1538.6 | 113.6 | 7.97193 | 2.9511 | | 12904.96 | 17.37805 |
| | 8184 (130( | 42 | 25 | -17 | -40.4762 | 2.93715 | | 289 | 0.512195 |
| | 8236 (330 | 15 | 5.8 | -9.2 | -61.3333 | 2.8528 | | 84.64 | 0.182927 |
| | 12404 (13( | 36 | 54.6 | 18.6 | 51.6667 | 2.76353 | | 345.96 | 0.439024 |
| | 12423 (13( | 80 | 58.4 | -21.6 | -27 | 2.59657 | | 466.56 | 0.97561 |
| | 13284112 ( | 3 | 0 | -3 | -100 | 2.44949 | | 9 | 0.036585 |
| | 12424 (13( | 135 | 109.2 | -25.8 | -19.1111 | 2.33487 | | 665.64 | 1.646341 |
| | 13284092 ( | 137.333 | 165 | 27.6667 | 20.1456 | 2.25024 | | 765.4463 | 1.674793 |
| | 8180 (130( | 328 | 290.4 | -37.6 | -11.4634 | 2.1383 | | 1413.76 | 4 |
| | 10377 (33( | 707 | 764.6 | 57.6 | 8.1471 | 2.12345 | | 3317.76 | 8.621951 |
| | 8210 (180( | 1611 | 1530.4 | -80.6 | -5.0031 | 2.03371 | | 6496.36 | 19.64634 |
| | 13284071 ( | 165 | 191.6 | 26.6 | 16.1212 | 1.99208 | | 707.56 | 2.012195 |
| | 12422 (13( | 133 | 112.4 | -20.6 | -15.4887 | 1.85971 | | 424.36 | 1.621951 |
| | 8312 (130( | 53 | 66 | 13 | 24.5283 | 1.68533 | | 169 | 0.646341 |
| | 13566 (34( | 41 | 31.2 | -9.8 | -23.9024 | 1.63107 | | 96.04 | 0.5 |
| | 8316 (130( | 387 | 417.8 | 30.8 | 7.95866 | 1.5354 | | 948.64 | 4.719512 |
| | 13284122 ( | 1262 | 1212.4 | -49.6 | -3.93027 | 1.41014 | | 2460.16 | 15.39024 |
| | 8060 (331( | 41 | 32.6 | -8.4 | -20.4878 | 1.3847 | | 70.56 | 0.5 |
| | 8212 (180( | 75 | 63.8 | -11.2 | -14.9333 | 1.34443 | | 125.44 | 0.914634 |
| | 13284126 ( | 58 | 68.6 | 10.6 | 18.2759 | 1.33231 | | 112.36 | 0.707317 |
| | 13284068 ( | 1308 | 1356.4 | 48.4 | 3.70031 | 1.32605 | | 2342.56 | 15.95122 |
| | 13284094 ( | 92 | 103.6 | 11.6 | 12.6087 | 1.17297 | | 134.56 | 1.121951 |
| | 8308 (130( | 830 | 796.8 | -33.2 | -4 | 1.16409 | | 1102.24 | 10.12195 |
| | 13284070 ( | 1059 | 1022.4 | -36.6 | -3.45609 | 1.13454 | | 1339.56 | 12.91463 |
| | 8202 (180( | 161 | 147.4 | -13.6 | -8.4472 | 1.09521 | | 184.96 | 1.963415 |
| | 10379 (33( | 1346 | 1307 | -39 | -2.89747 | 1.07081 | | 1521 | 16.41463 |
| | 8318 (130( | 39 | 32.6 | -6.4 | -16.4103 | 1.06964 | | 40.96 | 0.47561 |
| | 12118 | 1438 | 1478.6 | 40.6 | 2.82337 | 1.06317 | | 1648.36 | 17.53659 |
| | 13562 (34( | 220 | 235.4 | 15.4 | 7 | 1.02056 | | 237.16 | 2.682927 |
| | 13284069 ( | 39 | 33 | -6 | -15.3846 | 1 | | 36 | 0.47561 |
| | 8238 (331 | 18 | 21.8 | 3.8 | 21.1111 | 0.851838 | | 14.44 | 0.219512 |
| | 8320 (130( | 74 | 68.6 | -5.4 | -7.2973 | 0.639512 | | 29.16 | 0.902439 |
| | 13284125 ( | 1131 | 1152 | 21 | 1.85676 | 0.621558 | | 441 | 13.79268 |
| | 8208 (180( | 1363 | 1385.4 | 22.4 | 1.64343 | 0.604259 | | 501.76 | 16.62195 |
| | 8056 (330( | 26 | 28.8 | 2.8 | 10.7692 | 0.534913 | | 7.84 | 0.317073 |
| | 12421 (13( | 763 | 751.6 | -11.4 | -1.4941 | 0.414258 | | 129.96 | 9.304878 |
| | 8232 (331( | 7 | 6.2 | -0.8 | -11.4286 | 0.3114 | | 0.64 | 0.085366 |
| | 13284131 ( | 17 | 16.2 | -0.8 | -4.70588 | 0.196352 | | 0.64 | 0.207317 |
| | 13284097 ( | 0.666667 | 0.8 | 0.133333 | 20 | 0.1557 | | 0.017778 | 0.00813 |
| | 8050 (330( | 1780 | 1784.8 | 4.8 | 0.269663 | 0.113694 | | 23.04 | 21.70732 |
| | 13284096 ( | 5.66667 | 5.6 | -0.06667 | -1.17647 | 0.028088 | | 0.004444 | 0.069106 |
| | 13284093 ( | 0 | 0 | 0 | 0 | 0 | | 0 | 0 |
| | 13284109 ( | 0 | 0 | 0 | 0 | 0 | | 0 | 0 |
| | 13284110 ( | 0 | 0 | 0 | 0 | 0 | | 0 | 0 |
| | Mean | 405.358 | 415.447 | 10.0892 | 2.48895 | | | | |

| Object | Count - SC | Count - Av | Absolute | Relative D | GEH | 11.5248 | Diff^2 | Obs/N |
|---|---|---|---|---|---|---|---|---|
| 7228 | 93 | 242.2 | 149.2 | 160.43 | 11.5248 | | 22260.64 | 1.134146 |
| 12210663 | 413 | 609.2 | 196.2 | 47.5061 | 8.67853 | | 38494.44 | 5.036585 |
| 7172 | 1836 | 1531.6 | -304.4 | -16.5795 | 7.41821 | | 92659.36 | 22.39024 |
| 7116 | 1873 | 1566.8 | -306.2 | -16.3481 | 7.38335 | | 93758.44 | 22.84146 |
| 7428 | 679 | 844.6 | 165.6 | 24.3888 | 5.99984 | | 27423.36 | 8.280488 |
| 12152 | 1838 | 1599 | -239 | -13.0033 | 5.76532 | | 57121 | 22.41463 |
| 7540 | 693 | 564.6 | -128.4 | -18.5281 | 5.12046 | | 16486.56 | 8.45122 |
| 16119 | 1682 | 1502.4 | -179.6 | -10.6778 | 4.50098 | | 32256.16 | 20.5122 |
| 16517 | 934 | 803.8 | -130.2 | -13.94 | 4.41699 | | 16952.04 | 11.39024 |
| 7164 | 568 | 672.8 | 104.8 | 18.4507 | 4.20751 | | 10983.04 | 6.926829 |
| 12211544 | 629 | 735.2 | 106.2 | 16.8839 | 4.06631 | | 11278.44 | 7.670732 |
| 7442 | 534 | 628.4 | 94.4 | 17.6779 | 3.9157 | | 8911.36 | 6.512195 |
| 7180 | 808 | 707 | -101 | -12.5 | 3.6697 | | 10201 | 9.853659 |
| 7210 | 126 | 89.2 | -36.8 | -29.2063 | 3.54766 | | 1354.24 | 1.536585 |
| 13643 | 1209 | 1330.2 | 121.2 | 10.0248 | 3.40149 | | 14689.44 | 14.7439 |
| 12210320 | 1270 | 1392.8 | 122.8 | 9.66929 | 3.36546 | | 15079.84 | 15.4878 |
| 7410 | 101 | 70 | -31 | -30.6931 | 3.35258 | | 961 | 1.231707 |
| 7730 | 487 | 559.2 | 72.2 | 14.8255 | 3.15678 | | 5212.84 | 5.939024 |
| 17011 | 677 | 597.6 | -79.4 | -11.7282 | 3.1452 | | 6304.36 | 8.256098 |
| 7066 | 61 | 38.8 | -22.2 | -36.3934 | 3.1427 | | 492.84 | 0.743902 |
| 6964 | 1216 | 1328 | 112 | 9.21053 | 3.14032 | | 12544 | 14.82927 |
| 7098 | 36 | 57.2 | 21.2 | 58.8889 | 3.10558 | | 449.44 | 0.439024 |
| 6962 | 2972 | 3143.4 | 171.4 | 5.76716 | 3.09966 | | 29377.96 | 36.2439 |
| 7276 | 282 | 335.6 | 53.6 | 19.0071 | 3.05018 | | 2872.96 | 3.439024 |
| 10618 | 929 | 1023.8 | 94.8 | 10.2045 | 3.03385 | | 8987.04 | 11.32927 |
| 12210282 | 1479 | 1371.4 | -107.6 | -7.27519 | 2.85019 | | 11577.76 | 18.03659 |
| 12210270 | 1 | 6.2 | 5.2 | 520 | 2.74064 | | 27.04 | 0.012195 |
| 12211719 | 1375 | 1277 | -98 | -7.12727 | 2.69125 | | 9604 | 16.76829 |
| 16548 | 484 | 545 | 61 | 12.6033 | 2.68929 | | 3721 | 5.902439 |
| 12211629 | 16 | 7.4 | -8.6 | -53.75 | 2.51423 | | 73.96 | 0.195122 |
| 7036 | 22 | 11.8 | -10.2 | -46.3636 | 2.48117 | | 104.04 | 0.268293 |
| 7390 | 933 | 860.2 | -72.8 | -7.80279 | 2.43126 | | 5299.84 | 11.37805 |
| 12211631 | 13 | 22.6 | 9.6 | 73.8462 | 2.27542 | | 92.16 | 0.158537 |
| 7214 | 119 | 145 | 26 | 21.8487 | 2.26301 | | 676 | 1.45122 |
| 7400 | 1126 | 1051.6 | -74.4 | -6.60746 | 2.25475 | | 5535.36 | 13.73171 |
| 7254 | 1066 | 1140.8 | 74.8 | 7.01689 | 2.25183 | | 5595.04 | 13 |
| 7240 | 763 | 826.4 | 63.4 | 8.30931 | 2.24899 | | 4019.56 | 9.304878 |
| 7106 | 502 | 457.6 | -44.4 | -8.84462 | 2.027 | | 1971.36 | 6.121951 |
| 7356 | 1065 | 1003.6 | -61.4 | -5.76526 | 1.90917 | | 3769.96 | 12.9878 |
| 15955 | 1054 | 993 | -61 | -5.78748 | 1.90672 | | 3721 | 12.85366 |
| 12211562 | 1374 | 1307.4 | -66.6 | -4.84716 | 1.8189 | | 4435.56 | 16.7561 |
| 12211622 | 894 | 948.4 | 54.4 | 6.08501 | 1.79235 | | 2959.36 | 10.90244 |
| 7192 | 225 | 200.2 | -24.8 | -11.0222 | 1.70087 | | 615.04 | 2.743902 |
| 7126 | 213 | 189.2 | -23.8 | -11.1737 | 1.67831 | | 566.44 | 2.597561 |
| 7074 | 1656 | 1724.6 | 68.6 | 4.14251 | 1.66856 | | 4705.96 | 20.19512 |
| 12211551 | 702 | 746.6 | 44.6 | 6.35328 | 1.6572 | | 1989.16 | 8.560976 |
| 16525 | 2476 | 2400.8 | -75.2 | -3.03716 | 1.52288 | | 5655.04 | 30.19512 |
| 7274 | 1111 | 1161.6 | 50.6 | 4.55446 | 1.50108 | | 2560.36 | 13.54878 |
| 7724 | 2884 | 2809.6 | -74.4 | -2.57975 | 1.39442 | | 5535.36 | 35.17073 |
| 7524 | 194 | 213.6 | 19.6 | 10.1031 | 1.37295 | | 384.16 | 2.365854 |
| 12210661 | 1880 | 1939.4 | 59.4 | 3.15957 | 1.35926 | | 3528.36 | 22.92683 |
| 12210676 | 11 | 7 | -4 | -36.3636 | 1.33333 | | 16 | 0.134146 |
| 7166 | 829 | 867.6 | 38.6 | 4.65621 | 1.3253 | | 1489.96 | 10.10976 |
| 12210502 | 664 | 630.4 | -33.6 | -5.06024 | 1.32075 | | 1128.96 | 8.097561 |
| 11897 | 369 | 344.4 | -24.6 | -6.66667 | 1.30252 | | 605.16 | 4.5 |
| 7222 | 2438 | 2375.2 | -62.8 | -2.57588 | 1.28014 | | 3943.84 | 29.73171 |
| 7408 | 830 | 867 | 37 | 4.45783 | 1.27021 | | 1369 | 10.12195 |
| 12126 | 1525 | 1569.2 | 44.2 | 2.89836 | 1.12373 | | 1953.64 | 18.59756 |
| 7140 | 142 | 155.4 | 13.4 | 9.43662 | 1.09888 | | 179.56 | 1.731707 |
| 7220 | 1045 | 1009.8 | -35.2 | -3.36842 | 1.09818 | | 1239.04 | 12.7439 |
| 7532 | 1153 | 1117.2 | -35.8 | -3.10494 | 1.06259 | | 1281.64 | 14.06098 |
| 12155 | 1688 | 1648 | -40 | -2.36967 | 0.979404 | | 1600 | 20.58537 |
| 7732 | 375 | 392.8 | 17.8 | 4.74667 | 0.908471 | | 316.84 | 4.573171 |
| 7040 | 38 | 43.6 | 5.6 | 14.7368 | 0.876714 | | 31.36 | 0.463415 |
| 12870 | 703 | 681.2 | -21.8 | -3.101 | 0.828652 | | 475.24 | 8.573171 |
| 7092 | 37 | 32.6 | -4.4 | -11.8919 | 0.74587 | | 19.36 | 0.45122 |
| 7042 | 1666 | 1636 | -30 | -1.80072 | 0.738325 | | 900 | 20.31707 |
| 12210516 | 1272 | 1248.4 | -23.6 | -1.85535 | 0.664802 | | 556.96 | 15.5122 |
| 6940 | 1613 | 1639.2 | 26.2 | 1.6243 | 0.649722 | | 686.44 | 19.67073 |
| 7438 | 136 | 143.6 | 7.6 | 5.58824 | 0.642777 | | 57.76 | 1.658537 |
| 16027 | 1046 | 1027.2 | -18.8 | -1.79732 | 0.583919 | | 353.44 | 12.7561 |
| 12210262 | 781 | 794.6 | 13.6 | 1.74136 | 0.484541 | | 184.96 | 9.52439 |
| 15953 | 1935 | 1954.4 | 19.4 | 1.00258 | 0.439922 | | 376.36 | 23.59756 |
| 7118 | 2299 | 2278.2 | -20.8 | -0.90474 | 0.434789 | | 432.64 | 28.03659 |
| 7104 | 40 | 37.8 | -2.2 | -5.5 | 0.352734 | | 4.84 | 0.487805 |
| 12210514 | 744 | 750.6 | 6.6 | 0.887097 | 0.241433 | | 43.56 | 9.073171 |
| 12211534 | 20 | 19.2 | -0.8 | -4 | 0.180702 | | 0.64 | 0.243902 |
| 12210650 | 1624 | 1617.6 | -6.4 | -0.39409 | 0.15897 | | 40.96 | 19.80488 |
| 17220 | 73 | 71.8 | -1.2 | -1.64384 | 0.14103 | | 1.44 | 0.890244 |
| 12211564 | 30 | 29.8 | -0.2 | -0.66667 | 0.036576 | | 0.04 | 0.365854 |
| 6920 | 1622 | 1620.6 | -1.4 | -0.08631 | 0.034769 | | 1.96 | 19.78049 |
| 15596 | 1837 | 1836.8 | -0.2 | -0.01089 | 0.004666 | | 0.04 | 22.40244 |
| Mean | 904.366 | 899.776 | -4.59024 | -0.50757 | | | | |



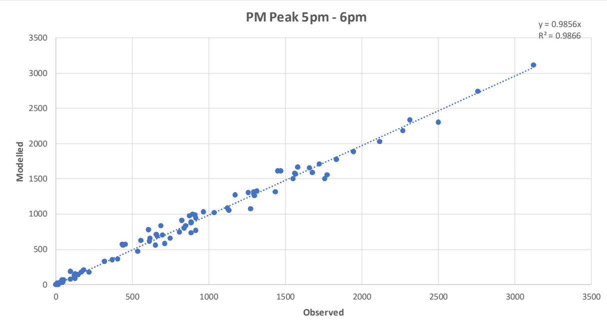

| | | |
|---|---|---|
| | Link | |
| | <5 | 91% |
| | <7.5 | 98% |
| | <10 | 99% |
| 82 | RMSE | 10% |

| | | |
|---|---|---|
| | Turn | |
| | <5 | 78% |
| | <7.5 | 94% |
| | <10 | 99% |
| 80 | RMSE | 19% |

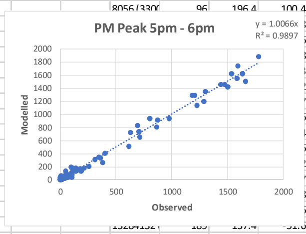



| Object | Count - SC | Count - Av | Absolute | Relative D | GEH | Diff^2 | Obs/N |
|---|---|---|---|---|---|---|---|
| 8056 (3300 | 64 | 176.2 | 112.2 | 175.312 | 10.2381 | 12588.84 | 0.780488 |
| 13284072 ( | 7 | 66.4 | 59.4 | 848.571 | 9.80513 | 3528.36 | 0.085366 |
| 13284096 ( | 3 | 48.2 | 45.2 | 1506.67 | 8.93343 | 2043.04 | 0.036585 |
| 10376 (330 | 67 | 157.8 | 90.8 | 135.522 | 8.56451 | 8244.64 | 0.817073 |
| 8062 (3315 | 5 | 46.4 | 41.4 | 828 | 8.16646 | 1713.96 | 0.060976 |
| [illegible] | [illegible] | [illegible] | [illegible] | -60.198 | 7.23604 | 3696.64 | 1.231707 |
| [illegible] | [illegible] | [illegible] | [illegible] | -17.4825 | 6.92046 | 62500 | 17.43902 |
| [illegible] | [illegible] | [illegible] | [illegible] | 84.1667 | 6.91838 | 6528.64 | 1.170732 |
| [illegible] | [illegible] | [illegible] | [illegible] | -30.0756 | 6.50124 | 14256.36 | 4.841463 |
| [illegible] | [illegible] | [illegible] | [illegible] | 203 | 6.39549 | 1648.36 | 0.243902 |
| [illegible] | [illegible] | [illegible] | [illegible] | 312 | 6.16644 | 973.44 | 0.121951 |
| [illegible] | [illegible] | [illegible] | [illegible] | 495.714 | 5.74162 | 535.1496 | 0.056911 |
| [illegible] | [illegible] | [illegible] | [illegible] | -13.1451 | 5.72317 | 54195.84 | 21.59756 |
| [illegible] | [illegible] | [illegible] | [illegible] | -14.2641 | 5.64409 | 43014.76 | 17.73171 |
| [illegible] | [illegible] | [illegible] | [illegible] | 56.0714 | 5.24427 | 3943.84 | 1.365854 |
| [illegible] | [illegible] | [illegible] | [illegible] | -45.6566 | 5.17121 | 2043.04 | 1.207317 |
| [illegible] | [illegible] | [illegible] | [illegible] | -12.2296 | 5.13467 | 40965.76 | 20.18293 |
| [illegible] | [illegible] | [illegible] | [illegible] | -16.229 | 5.05366 | 20909.16 | 10.86585 |
| [illegible] | [illegible] | [illegible] | 14 | 1400 | 4.94975 | 196 | 0.012195 |
| 8318 (1300 | 87 | 48.6 | -38.4 | -44.1379 | 4.66355 | 1474.56 | 1.060976 |
| 13284133 ( | 1041 | 903.8 | -137.2 | -13.1796 | 4.39979 | 18823.84 | 12.69512 |
| 10379 (330 | 829 | 707.2 | -121.8 | -14.6924 | 4.39479 | 14835.24 | 10.10976 |
| 13564 (340 | 141 | 198.2 | 57.2 | 40.5674 | 4.39221 | 3271.84 | 1.719512 |
| 13284123 ( | 253 | 188.2 | -64.8 | -25.6126 | 4.36287 | 4199.04 | 3.085366 |
| 8208 (1800 | 1583 | 1414.8 | -168.2 | -10.6254 | 4.3445 | 28291.24 | 19.30488 |
| 13566 (340 | 74 | 41.4 | -32.6 | -44.0541 | 4.2917 | 1062.76 | 0.902439 |
| 13284108 ( | 9 | 0 | -9 | -100 | 4.24264 | 81 | 0.109756 |
| 8320 (1300 | 652 | 549.2 | -102.8 | -15.7669 | 4.1947 | 10567.84 | 7.95122 |
| 12421 (130 | 1635 | 1796.4 | 161.4 | 9.87156 | 3.89657 | 26049.96 | 19.93902 |
| 10375 (331 | 52 | 83.8 | 31.8 | 61.1538 | 3.85916 | 1011.24 | 0.634146 |
| 8308 (1300 | 1789 | 1946.8 | 157.8 | 8.82057 | 3.65115 | 24900.84 | 21.81707 |
| 13284122 ( | 1125 | 1007.4 | -117.6 | -10.4533 | 3.60154 | 13829.76 | 13.71951 |
| 13284073 ( | 218 | 169 | -49 | -22.4771 | 3.52254 | 2401 | 2.658537 |
| 13284135 ( | 416 | 350.8 | -65.2 | -15.6731 | 3.32983 | 4251.04 | 5.073171 |
| 12118 | 1703 | 1574.2 | -128.8 | -7.56312 | 3.18185 | 16589.44 | 20.76829 |
| 10374 (330 | 357 | 299.4 | -57.6 | -16.1345 | 3.17946 | 3317.76 | 4.353659 |
| 8180 (1300 | 135 | 100.6 | -34.4 | -25.4815 | 3.16946 | 1183.36 | 1.646341 |
| 13284068 ( | 967 | 873.4 | -93.6 | -9.67942 | 3.08557 | 8760.96 | 11.79268 |
| 8232 (3310 | 15 | 5.2 | -9.8 | -65.3333 | 3.08365 | 96.04 | 0.182927 |
| 13284069 ( | 34 | 54 | 20 | 58.8235 | 3.01511 | 400 | 0.414634 |
| 8312 (1300 | 21 | 9.4 | -11.6 | -55.2381 | 2.97534 | 134.56 | 0.256098 |
| 8182 (1300 | 1726 | 1609.2 | -116.8 | -6.76709 | 2.8602 | 13642.24 | 21.04878 |
| 13284112 ( | 4 | 0 | -4 | -100 | 2.82843 | 16 | 0.04878 |
| 13284130 ( | 129 | 99 | -30 | -23.2558 | 2.80976 | 900 | 1.573171 |
| 8224 (3315 | 4.33333 | 0.2 | -4.13333 | -95.3846 | 2.74541 | 17.08442 | 0.052845 |
| 8240 (3300 | 41 | 25.4 | -15.6 | -38.0488 | 2.70742 | 243.36 | 0.5 |
| 13284121 ( | 52 | 35.4 | -16.6 | -31.9231 | 2.51112 | 275.56 | 0.634146 |
| 13284109 ( | 3 | 0 | -3 | -100 | 2.44949 | 9 | 0.036585 |
| 13565 (341 | 164 | 134.6 | -29.4 | -17.9268 | 2.40612 | 864.36 | 2 |
| 8314 (1300 | 877 | 946.8 | 69.8 | 7.95895 | 2.31144 | 4872.04 | 10.69512 |
| 13563 (340 | 388 | 344.6 | -43.4 | -11.1856 | 2.26763 | 1883.56 | 4.731707 |
| 8184 (1300 | 220 | 189.2 | -30.8 | -14 | 2.15327 | 948.64 | 2.682927 |
| 8050 (3300 | 1711 | 1629 | -82 | -4.79252 | 2.00658 | 6724 | 20.86585 |
| 13284110 ( | 2 | 0 | -2 | -100 | 2 | 4 | 0.02439 |
| 13284113 ( | 2 | 0 | -2 | -100 | 2 | 4 | 0.02439 |
| 12422 (130 | 182 | 159.2 | -22.8 | -12.5275 | 1.7456 | 519.84 | 2.219512 |
| 13284126 ( | 38 | 28 | -10 | -26.3158 | 1.74078 | 100 | 0.463415 |
| 12424 (130 | 131 | 150.2 | 19.2 | 14.6565 | 1.61923 | 368.64 | 1.597561 |
| 8212 (1800 | 167 | 147 | -20 | -11.976 | 1.59617 | 400 | 2.036585 |
| 10378 (331 | 106 | 122.6 | 16.6 | 15.6604 | 1.55269 | 275.56 | 1.292683 |
| 8206 (1800 | 135 | 153.4 | 18.4 | 13.6296 | 1.53227 | 338.56 | 1.646341 |
| 8238 (3315 | 12 | 17.6 | 5.6 | 46.6667 | 1.45565 | 31.36 | 0.146341 |
| 12425 (130 | 802 | 842.4 | 40.4 | 5.03741 | 1.40894 | 1632.16 | 9.780488 |
| 13562 (340 | 71 | 83.2 | 12.2 | 17.1831 | 1.38942 | 148.84 | 0.865854 |
| 8176 (1300 | 1516 | 1465.4 | -50.6 | -3.33773 | 1.31056 | 2560.36 | 18.4878 |
| 13284125 ( | 1454 | 1414.6 | -39.4 | -2.70977 | 1.04034 | 1552.36 | 17.73171 |
| 13284132 ( | 179 | 165.4 | -13.6 | -7.59777 | 1.03639 | 184.96 | 2.182927 |
| 13284124 ( | 76 | 84.6 | 8.6 | 11.3158 | 0.959711 | 73.96 | 0.926829 |
| 13284093 ( | 0.333333 | 0 | -0.33333 | -100 | 0.816497 | 0.111111 | 0.004065 |
| 8202 (1800 | 166 | 156.2 | -9.8 | -5.90361 | 0.772108 | 96.04 | 2.02439 |
| 8236 (3302 | 10 | 7.8 | -2.2 | -22 | 0.737442 | 4.84 | 0.121951 |
| 8170 (3202 | 719 | 701.8 | -17.2 | -2.39221 | 0.645323 | 295.84 | 8.768293 |
| 8058 (3302 | 28 | 24.8 | -3.2 | -11.4286 | 0.622799 | 10.24 | 0.341463 |
| 8060 (3310 | 76 | 80.8 | 4.8 | 6.31579 | 0.542105 | 23.04 | 0.926829 |
| 12404 (130 | 36 | 38.4 | 2.4 | 6.66667 | 0.393496 | 5.76 | 0.439024 |
| 8316 (1300 | 76 | 79.2 | 3.2 | 4.21053 | 0.363261 | 10.24 | 0.926829 |
| 10377 (330 | 1321 | 1308.8 | -12.2 | -0.92354 | 0.336445 | 148.84 | 16.10976 |
| 13284070 ( | 1317 | 1324.8 | 7.8 | 0.592255 | 0.214615 | 60.84 | 16.06098 |
| 13284097 ( | 0.333333 | 0.4 | 0.066667 | 20 | 0.110096 | 0.004444 | 0.004065 |
| 12423 (130 | 65 | 65.8 | 0.8 | 1.23077 | 0.098924 | 0.64 | 0.792683 |
| Mean | 441.633 | 418.553 | -23.0808 | -5.22624 | | | |

| Object | Count - SC | Count - Av | Absolute | Relative D | GEH | 7.98611 | Diff^2 | Obs/N |
|---|---|---|---|---|---|---|---|---|
| 7228 | 96 | 191.8 | 95.8 | 99.7917 | 7.98611 | | 9177.64 | 1.170732 |
| 7240 | 608 | 782.4 | 174.4 | 28.6842 | 6.61442 | | 30415.36 | 7.414634 |
| 12210663 | 435 | 578.4 | 143.4 | 32.9655 | 6.3705 | | 20563.56 | 5.304878 |
| 7172 | 1759 | 1510.2 | -248.8 | -14.1444 | 6.15382 | | 61901.44 | 21.45122 |
| 7532 | 1276 | 1080.6 | -195.4 | -15.3135 | 5.69242 | | 38181.16 | 15.56098 |
| 7428 | 687 | 840.2 | 153.2 | 22.2999 | 5.54403 | | 23470.24 | 8.378049 |
| 7116 | 1776 | 1555 | -221 | -12.4437 | 5.41527 | | 48841 | 21.65854 |
| 7390 | 887 | 733.2 | -153.8 | -17.3393 | 5.40365 | | 23654.44 | 10.81707 |
| 16548 | 441 | 557.8 | 116.8 | 26.4853 | 5.22659 | | 13642.24 | 5.378049 |
| 7730 | 457 | 572.8 | 115.8 | 25.3392 | 5.10325 | | 13409.64 | 5.573171 |
| 16517 | 914 | 766.6 | -147.4 | -16.1269 | 5.08488 | | 21726.76 | 11.14634 |
| 12210502 | 713 | 589 | -124 | -17.3913 | 4.85994 | | 15376 | 8.695122 |
| 7098 | 39 | 73.8 | 34.8 | 89.2308 | 4.63383 | | 1211.04 | 0.47561 |
| 6940 | 1449 | 1618.8 | 169.8 | 11.7184 | 4.3355 | | 28832.04 | 17.67073 |
| 7222 | 2503 | 2310 | -193 | -7.71075 | 3.93427 | | 37249 | 30.52439 |
| 12210270 | 0 | 7.6 | 7.6 | inf | 3.89872 | | 57.76 | 0 |
| 12126 | 1470 | 1619.4 | 149.4 | 10.1633 | 3.80127 | | 22320.36 | 17.92683 |
| 7210 | 127 | 89 | -38 | -29.9213 | 3.65655 | | 1444 | 1.54878 |
| 17011 | 653 | 564.4 | -88.6 | -13.5681 | 3.59114 | | 7849.96 | 7.963415 |
| 16027 | 896 | 1005 | 109 | 12.1652 | 3.5355 | | 11881 | 10.92683 |
| 7220 | 876 | 980.4 | 104.4 | 11.9178 | 3.42673 | | 10899.36 | 10.68293 |
| 12210282 | 1434 | 1314.4 | -119.6 | -8.34031 | 3.22631 | | 14304.16 | 17.4878 |
| 7540 | 746 | 665.4 | -80.6 | -10.8043 | 3.03407 | | 6496.36 | 9.097561 |
| 7164 | 557 | 629.2 | 72.2 | 12.9623 | 2.96465 | | 5212.84 | 6.792683 |
| 13643 | 1175 | 1276.8 | 101.8 | 8.66383 | 2.9075 | | 10363.24 | 14.32927 |
| 12211629 | 16 | 6.4 | -9.6 | -60 | 2.86855 | | 92.16 | 0.195122 |
| 7166 | 825 | 907.6 | 82.6 | 10.0121 | 2.80638 | | 6822.76 | 10.06098 |
| 15955 | 908 | 990.6 | 82.6 | 9.09692 | 2.68089 | | 6822.76 | 11.07317 |
| 7126 | 217 | 180 | -37 | -17.0507 | 2.62616 | | 1369 | 2.646341 |
| 7106 | 535 | 477.4 | -57.6 | -10.7664 | 2.56013 | | 3317.76 | 6.52439 |
| 7400 | 1133 | 1052 | -81 | -7.14916 | 2.45061 | | 6561 | 13.81707 |
| 12210262 | 811 | 744 | -67 | -8.26141 | 2.40284 | | 4489 | 9.890244 |
| 12211631 | 13 | 23.2 | 10.2 | 78.4615 | 2.39751 | | 104.04 | 0.158537 |
| 7410 | 97 | 75.6 | -21.4 | -22.0619 | 2.30361 | | 457.96 | 1.182927 |
| 7438 | 126 | 152.4 | 26.4 | 20.9524 | 2.23761 | | 696.96 | 1.536585 |
| 7074 | 1584 | 1673.6 | 89.6 | 5.65657 | 2.22011 | | 8028.16 | 19.31707 |
| 7036 | 23 | 13.6 | -9.4 | -40.8696 | 2.19737 | | 88.36 | 0.280488 |
| 12211551 | 657 | 714.4 | 57.4 | 8.73668 | 2.19202 | | 3294.76 | 8.012195 |
| 17220 | 52 | 68.2 | 16.2 | 31.1538 | 2.08967 | | 262.44 | 0.634146 |
| 7732 | 403 | 362.2 | -40.8 | -10.1241 | 2.08587 | | 1664.64 | 4.914634 |
| 12152 | 1677 | 1596.4 | -80.6 | -4.8062 | 1.99228 | | 6496.36 | 20.45122 |
| 7524 | 182 | 209.8 | 27.8 | 15.2747 | 1.98622 | | 772.84 | 2.219512 |
| 7274 | 968 | 1030 | 62 | 6.40496 | 1.96159 | | 3844 | 11.80488 |
| 12210676 | 13 | 7 | -6 | -46.1538 | 1.89737 | | 36 | 0.158537 |
| 12210661 | 2115 | 2030.8 | -84.2 | -3.98109 | 1.84937 | | 7089.64 | 25.79268 |
| 16525 | 2271 | 2185.8 | -85.2 | -3.75165 | 1.80486 | | 7259.04 | 27.69512 |
| 12870 | 617 | 660.8 | 43.8 | 7.09887 | 1.73284 | | 1918.44 | 7.52439 |
| 7066 | 48 | 37.2 | -10.8 | -22.5 | 1.6547 | | 116.64 | 0.585366 |
| 12211562 | 1256 | 1306.8 | 50.8 | 4.04459 | 1.41913 | | 2580.64 | 15.31707 |
| 12210514 | 838 | 799.2 | -38.8 | -4.63007 | 1.35611 | | 1505.44 | 10.21951 |
| 7192 | 166 | 183.6 | 17.6 | 10.6024 | 1.3312 | | 309.76 | 2.02439 |
| 15953 | 1948 | 1889.8 | -58.2 | -2.98768 | 1.32861 | | 3387.24 | 23.7561 |
| 15596 | 1834 | 1784 | -50 | -2.72628 | 1.17558 | | 2500 | 22.36585 |
| 12211544 | 662 | 691.4 | 29.4 | 4.44109 | 1.13018 | | 864.36 | 8.073171 |
| 7254 | 1124 | 1089 | -35 | -3.11388 | 1.05219 | | 1225 | 13.70732 |
| 12211534 | 17 | 21.6 | 4.6 | 27.0588 | 1.04708 | | 21.16 | 0.207317 |
| 16119 | 1550 | 1509.6 | -40.4 | -2.60645 | 1.03291 | | 1632.16 | 18.90244 |
| 10618 | 917 | 948.2 | 31.2 | 3.4024 | 1.02166 | | 973.44 | 11.18293 |
| 11897 | 370 | 350.8 | -19.2 | -5.18919 | 1.01137 | | 368.64 | 4.512195 |
| 12211719 | 1299 | 1263.4 | -35.6 | -2.74057 | 0.994584 | | 1267.36 | 15.84146 |
| 7214 | 123 | 133.2 | 10.2 | 8.29268 | 0.901209 | | 104.04 | 1.5 |
| 7092 | 35 | 31 | -4 | -11.4286 | 0.696311 | | 16 | 0.426829 |
| 7040 | 40 | 44 | 4 | 10 | 0.617213 | | 16 | 0.487805 |
| 12210320 | 1292 | 1314 | 22 | 1.70279 | 0.609467 | | 484 | 15.7561 |
| 7408 | 848 | 832.8 | -15.2 | -1.79245 | 0.524325 | | 231.04 | 10.34146 |
| 7104 | 41 | 38 | -3 | -7.31707 | 0.477334 | | 9 | 0.5 |
| 7180 | 698 | 709.6 | 11.6 | 1.66189 | 0.437254 | | 134.56 | 8.512195 |
| 7276 | 320 | 327.2 | 7.2 | 2.25 | 0.400247 | | 51.84 | 3.902439 |
| 7356 | 1034 | 1021.2 | -12.8 | -1.23791 | 0.399299 | | 163.84 | 12.60976 |
| 7724 | 2759 | 2739.6 | -19.4 | -0.70315 | 0.369991 | | 376.36 | 33.64634 |
| 7118 | 2316 | 2333.6 | 17.6 | 0.759931 | 0.365023 | | 309.76 | 28.2439 |
| 7042 | 1564 | 1578.2 | 14.2 | 0.907928 | 0.35825 | | 201.64 | 19.07317 |
| 12210516 | 1314 | 1326.6 | 12.6 | 0.958904 | 0.346764 | | 158.76 | 16.02439 |
| 7140 | 149 | 144.8 | -4.2 | -2.81879 | 0.346528 | | 17.64 | 1.817073 |
| 12210650 | 1565 | 1574.8 | 9.8 | 0.626198 | 0.247338 | | 96.04 | 19.08537 |
| 12211564 | 32 | 33.2 | 1.2 | 3.75 | 0.210171 | | 1.44 | 0.390244 |
| 6920 | 1722 | 1714.2 | -7.8 | -0.45296 | 0.188179 | | 60.84 | 21 |
| 7442 | 612 | 615.6 | 3.6 | 0.588235 | 0.145308 | | 12.96 | 7.463415 |
| 6964 | 1293 | 1288.8 | -4.2 | -0.32483 | 0.116897 | | 17.64 | 15.76829 |
| 12155 | 1659 | 1663 | 4 | 0.241109 | 0.098147 | | 16 | 20.23171 |
| 6962 | 3121 | 3117.4 | -3.6 | -0.11535 | 0.064459 | | 12.96 | 38.06098 |
| 12211622 | 887 | 888.8 | 1.8 | 0.202931 | 0.060407 | | 3.24 | 10.81707 |
| Mean | 886.22 | 883.149 | -3.07073 | -0.3465 | | | | |




| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Link | | | | Turn | | |
| | <5 | 87% | | | <5 | 84% |
| | <7.5 | 99% | | | <7.5 | 94% |
| | <10 | 100% | | | <10 | 100% |
| 82 | RMSE | 9% | | 80 | RMSE | 14% |




| Object | Count - SC | Count - Av | Absolute | Relative D | GEH | | Diff^2 | Obs/N |
|---|---|---|---|---|---|---|---|---|
| 13284072 ( | 5 | 61.2 | 56.2 | 1124 | 9.76837 | | 3158.44 | 0.060976 |
| 10376 (330 | 50 | 137.4 | 87.4 | 174.8 | 9.02904 | | 7638.76 | 0.609756 |
| 13284096 ( | 0.666667 | 40.4 | 39.7333 | 5960 | 8.7685 | | 1578.735 | 0.00813 |
| 13284131 ( | 3 | 43.4 | 40.4 | 1346.67 | 8.38759 | | 1632.16 | 0.036585 |
| 8056 (330( | 96 | 196.4 | 100.4 | 104.583 | 8.30348 | | 10080.16 | 1.170732 |
| [illegible] | [illegible] | [illegible] | [illegible] | 485 | 7.41236 | | 1505.44 | 0.097561 |
| [illegible] | [illegible] | [illegible] | [illegible] | -57.451 | 6.87275 | | 3433.96 | 1.243902 |
| [illegible] | [illegible] | [illegible] | [illegible] | -30.8377 | 6.55355 | | 13876.84 | 4.658537 |
| [illegible] | [illegible] | [illegible] | [illegible] | 447.059 | 5.91659 | | 641.7761 | 0.069106 |
| [illegible] | [illegible] | [illegible] | [illegible] | 62.1239 | 5.76846 | | 4928.04 | 1.378049 |
| [illegible] | [illegible] | [illegible] | [illegible] | 4460 | 5.33453 | | 221.0188 | 0.004065 |
| [illegible] | [illegible] | [illegible] | [illegible] | 150.476 | 5.20911 | | 998.56 | 0.256098 |
| [illegible] | [illegible] | [illegible] | [illegible] | 20.0865 | 5.04431 | | 19432.36 | 8.463415 |
| [illegible] | [illegible] | [illegible] | [illegible] | 131.429 | 4.67864 | | 761.76 | 0.256098 |
| [illegible] | [illegible] | [illegible] | [illegible] | 16.7534 | 4.57164 | | 18279.04 | 9.841463 |
| [illegible] | [illegible] | [illegible] | [illegible] | 45.9412 | 4.41042 | | 2710.941 | 1.38211 |
| [illegible] | [illegible] | [illegible] | [illegible] | -15.9091 | 4.11561 | | 9604 | 7.512195 |
| [illegible] | [illegible] | [illegible] | [illegible] | -9.78928 | 4.09104 | | 26438.76 | 20.2561 |
| [illegible] | [illegible] | [illegible] | [illegible] | -27.3016 | 4.03915 | | 2662.56 | 2.304878 |
| 13284124 ( | 54 | 88 | 34 | 62.963 | 4.03506 | | 1156 | 0.658537 |
| 12426 (130 | 71 | 41.6 | -29.4 | -41.4085 | 3.91826 | | 864.36 | 0.865854 |
| 8170 (3202 | 628 | 728.6 | 100.6 | 16.0191 | 3.86267 | | 10120.36 | 7.658537 |
| 13566 (340 | 64 | 37.2 | -26.8 | -41.875 | 3.76755 | | 718.24 | 0.780488 |
| 12421 (130 | 1590 | 1742.4 | 152.4 | 9.58491 | 3.73355 | | 23225.76 | 19.39024 |
| 10375 (331 | 49 | 77.4 | 28.4 | 57.9592 | 3.5724 | | 806.56 | 0.597561 |
| 13284094 ( | 139.667 | 185 | 45.3333 | 32.4582 | 3.55806 | | 2055.108 | 1.703256 |
| 13284108 ( | 6 | 0 | -6 | -100 | 3.4641 | | 36 | 0.073171 |
| 8206 (1800 | 120 | 160.4 | 40.4 | 33.6667 | 3.41199 | | 1632.16 | 1.463415 |
| 13284123 ( | 254 | 202.6 | -51.4 | -20.2362 | 3.40181 | | 2641.96 | 3.097561 |
| 8238 (3315 | 8 | 20 | 12 | 150 | 3.20713 | | 144 | 0.097561 |
| 12423 (130 | 39 | 60.8 | 21.8 | 55.8974 | 3.08607 | | 475.24 | 0.47561 |
| 13284109 ( | 4 | 0 | -4 | -100 | 2.82843 | | 16 | 0.04878 |
| 13284070 ( | 1187 | 1286.4 | 99.4 | 8.37405 | 2.82653 | | 9880.36 | 14.47561 |
| 8202 (1800 | 179 | 144.8 | -34.2 | -19.1061 | 2.68784 | | 1169.64 | 2.182927 |
| 8232 (3310 | 16 | 7 | -9 | -56.25 | 2.65396 | | 81 | 0.195122 |
| 8228 (3300 | 1225 | 1137 | -88 | -7.18367 | 2.56069 | | 7744 | 14.93902 |
| 8308 (1300 | 1780 | 1882 | 102 | 5.73034 | 2.38372 | | 10404 | 21.70732 |
| 8060 (3310 | 104 | 81.2 | -22.8 | -21.9231 | 2.36935 | | 519.84 | 1.268293 |
| 8054 (3300 | 1285 | 1201.8 | -83.2 | -6.47471 | 2.35949 | | 6922.24 | 15.67073 |
| 8184 (1300 | 213 | 180 | -33 | -15.493 | 2.35414 | | 1089 | 2.597561 |
| 10377 (330 | 1205 | 1287 | 82 | 6.80498 | 2.32303 | | 6724 | 14.69512 |
| 12422 (130 | 173 | 145.4 | -27.6 | -15.9538 | 2.18745 | | 761.76 | 2.109756 |
| 8210 (1800 | 1501 | 1419.6 | -81.4 | -5.42305 | 2.13012 | | 6625.96 | 18.30488 |
| 12118 | 1536 | 1616.2 | 80.2 | 5.22135 | 2.02014 | | 6432.04 | 18.73171 |
| 10379 (330 | 712 | 659.4 | -52.6 | -7.38764 | 2.00872 | | 2766.76 | 8.682927 |
| 13284068 ( | 869 | 813 | -56 | -6.44419 | 1.93103 | | 3136 | 10.59756 |
| 8236 (3302 | 12 | 6.4 | -5.6 | -46.6667 | 1.84627 | | 31.36 | 0.146341 |
| 8312 (1300 | 13 | 7.2 | -5.8 | -44.6154 | 1.82502 | | 33.64 | 0.158537 |
| 8240 (3300 | 43 | 32.2 | -10.8 | -25.1163 | 1.76129 | | 116.64 | 0.52439 |
| 8316 (1300 | 52 | 64.4 | 12.4 | 23.8462 | 1.6254 | | 153.76 | 0.634146 |
| 13284135 ( | 362 | 333.6 | -28.4 | -7.8453 | 1.52284 | | 806.56 | 4.414634 |
| 12424 (130 | 140 | 157.6 | 17.6 | 12.5714 | 1.44282 | | 309.76 | 1.707317 |
| 13284110 ( | 1 | 0 | -1 | -100 | 1.41421 | | 1 | 0.012195 |
| 13284112 ( | 1 | 0 | -1 | -100 | 1.41421 | | 1 | 0.012195 |
| 13284093 ( | 1 | 0 | -1 | -100 | 1.41421 | | 1 | 0.012195 |
| 12404 (130 | 30 | 38 | 8 | 26.6667 | 1.37199 | | 64 | 0.365854 |
| 13284097 ( | 0.333333 | 1.6 | 1.26667 | 380 | 1.28832 | | 1.604453 | 0.004065 |
| 13284121 ( | 42 | 34.2 | -7.8 | -18.5714 | 1.26367 | | 60.84 | 0.512195 |
| 10378 (331 | 103 | 116.2 | 13.2 | 12.8155 | 1.26087 | | 174.24 | 1.256098 |
| 13284125 ( | 1303 | 1348.4 | 45.4 | 3.48427 | 1.2469 | | 2061.16 | 15.89024 |
| 13554 | 706 | 739.4 | 33.4 | 4.73088 | 1.24242 | | 1115.56 | 8.609756 |
| 8180 (1300 | 106 | 93.6 | -12.4 | -11.6981 | 1.24124 | | 153.76 | 1.292683 |
| 13284122 ( | 979 | 940.8 | -38.2 | -3.90194 | 1.23296 | | 1459.24 | 11.93902 |
| 13284133 ( | 874 | 909.2 | 35.2 | 4.02746 | 1.17885 | | 1239.04 | 10.65854 |
| 8224 (3315 | 1 | 0.2 | -0.8 | -80 | 1.0328 | | 0.64 | 0.012195 |
| 8058 (3302 | 28 | 24 | -4 | -14.2857 | 0.784465 | | 16 | 0.341463 |
| 8050 (3300 | 1584 | 1554 | -30 | -1.89394 | 0.757373 | | 900 | 19.31707 |
| 13562 (340 | 78 | 71.6 | -6.4 | -8.20513 | 0.739996 | | 40.96 | 0.95122 |
| 13284126 ( | 30 | 26.4 | -3.6 | -12 | 0.677919 | | 12.96 | 0.365854 |
| 13565 (341 | 137 | 130 | -7 | -5.10949 | 0.605839 | | 49 | 1.670732 |
| 8208 (1800 | 1442 | 1459.8 | 17.8 | 1.2344 | 0.467306 | | 316.84 | 17.58537 |
| 13563 (340 | 346 | 351.6 | 5.6 | 1.6185 | 0.299847 | | 31.36 | 4.219512 |
| 8318 (1300 | 49 | 47 | -2 | -4.08163 | 0.288675 | | 4 | 0.597561 |
| 8176 (1300 | 1472 | 1461.2 | -10.8 | -0.7337 | 0.282012 | | 116.64 | 17.95122 |
| 8182 (1300 | 1635 | 1625.4 | -9.6 | -0.58716 | 0.237767 | | 92.16 | 19.93902 |
| 13284073 ( | 159 | 161.8 | 2.8 | 1.76101 | 0.221083 | | 7.84 | 1.939024 |
| 13284130 ( | 95 | 93.2 | -1.8 | -1.89474 | 0.185557 | | 3.24 | 1.158537 |
| 8212 (1800 | 178 | 175.8 | -2.2 | -1.23596 | 0.165409 | | 4.84 | 2.170732 |
| 10374 (330 | 314 | 312.4 | -1.6 | -0.50955 | 0.090409 | | 2.56 | 3.829268 |
| 13284113 ( | 0 | 0 | 0 | 0 | 0 | | 0 | 0 |
| Mean | 402.7 | 409.758 | 7.0575 | 1.75255 | | | | |

Appendix I

# Travel Time Validation Tables

# AM

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | 0700-0800 | | | 0800-0900 | | | |
| Aimsun | Route Nar | Year_Mon | Period | Route ID | Route Nar | Seg ID | From | To | Length | Median Ti | 15th Perce | 85th Percentile (s | Median Ti | 15th Perce | 85th Perce | Route Nar |
| | **AM - Pakuranga Rd/Cascades Rd to Mt W Hwy** | | | | | | | | | | | | | | | |
| | | | | | | | | Cascades Road | | | | | | | | |
| 13284775 | Ellerslie P | 201806 | 7:00-8:00 | 55 | Ellerslie P | 795 | Cascades Road | Ti Rakau Drive | 2436 | 333 | 238 | 544 | 298 | 230 | 446 | Ellerslie P |
| 13284791 | Ellerslie P | 201806 | 7:00-8:00 | 55 | Ellerslie P | 796 | Ti Rakau Drive | Jellicoe Road | 2379 | 281 | 201 | 520 | 250 | 191 | 360 | Ellerslie P |
| 13285848 | Ellerslie P | 201806 | 7:00-8:00 | 55 | Ellerslie P | 797 | Jellicoe Road | Mt W Hwy | 549 | 92 | 61 | 131 | 87 | 62 | 113 | Ellerslie P |
| | **AM - Pakuranga Rd/ Mt W Hwy to Cascades Rd** | | | | | | | | | | | | | | | |
| | | | | | | | | Mt W Hwy | | | | | | | | |
| 13285849 | Ellerslie P | 201806 | 7:00-8:00 | 193 | Ellerslie P | 1628 | Mt Wellington Highwa | Jellicoe Road | 549 | 69 | 47 | 95 | 62 | 44 | 89 | Ellerslie P |
| 13284792 | Ellerslie P | 201806 | 7:00-8:00 | 193 | Ellerslie P | 1629 | Jellicoe Road | Ti Rakau Drive | 2379 | 252 | 219 | 323 | 251 | 196 | 301 | Ellerslie P |
| 13284793 | Ellerslie P | 201806 | 7:00-8:00 | 193 | Ellerslie P | 1630 | Ti Rakau Drive | Cascades Road | 2436 | 230 | 172 | 294 | 257 | 201 | 344 | Ellerslie P |
| | **AM - Ti Rakau Dr/Te Irirangi Dr to Mt W Hwy** | | | | | | | | | | | | | | | |
| | | | | | | | | Te Irirangi | | | | | | | | |
| 13284776 | Ellerslie P | 201806 | 7:00-8:00 | 193 | Ellerslie P | 1638 | Te Irirangi | Harris Road | 1351 | 141 | 103 | 206 | 180 | 120 | 289 | Ellerslie P |
| 13285850 | Freight - S | 201806 | 7:00-8:00 | 32 | Freight - S | 286 | Harris Road | Edgewater Drive | 2035 | 274 | 163 | 477 | 216 | 166 | 371 | Freight - S |
| 13284777 | Freight - S | 201806 | 7:00-8:00 | 32 | Freight - S | 287 | Edgewater Drive | Ti Rakau Dr | 823 | 184 | 94 | 261 | 185 | 97 | 249 | Freight - S |
| 13284778 | Freight - S | 201806 | 7:00-8:00 | 32 | Freight - S | 288 | Ti Rakau Dr | Pakuranga Highway | 1722 | 121 | 102 | 163 | 106 | 92 | 136 | Freight - S |
| 13285851 | Freight - S | 201806 | 7:00-8:00 | 32 | Freight - S | 289 | Pakuranga Highway | Carbine Road | 826 | 102 | 61 | 153 | 105 | 57 | 181 | Freight - S |
| 13284779 | Freight - S | 201806 | 7:00-8:00 | 32 | Freight - S | 290 | Carbine Road | SH1 | 889 | 65 | 53 | 77 | 61 | 51 | 73 | Freight - S |
| | **AM - Ti Rakau Dr/Mt W Hwy to Te Irirangi Dr** | | | | | | | | | | | | | | | |
| | | | | | | | | SH1 | | | | | | | | |
| 13284780 | Freight - S | 201806 | 7:00-8:00 | 32 | Freight - S | 290 | SH1 | Carbine Road | 889 | 61 | 47 | 137 | 60 | 47 | 158 | Freight - S |
| 13285861 | Freight - S | 201806 | 7:00-8:00 | 32 | Freight - S | 289 | Carbine Road | Pakuranga Highway | 826 | 54 | 46 | 70 | 54 | 46 | 70 | Freight - S |
| 13284781 | Freight - S | 201806 | 7:00-8:00 | 32 | Freight - S | 288 | Pakuranga Highway | Ti Rakau Dr | 1722 | 127 | 98 | 244 | 182 | 99 | 301 | Freight - S |
| 13284782 | Freight - S | 201806 | 7:00-8:00 | 32 | Freight - S | 287 | Ti Rakau Dr | Edgewater Drive | 823 | 66 | 57 | 123 | 71 | 61 | 181 | Freight - S |
| 13284783 | Freight - S | 201806 | 7:00-8:00 | 32 | Freight - S | 286 | Edgewater Drive | Harris Road | 2035 | 191 | 144 | 236 | 188 | 149 | 239 | Freight - S |
| 13285862 | Ellerslie P | 201806 | 7:00-8:00 | 32 | Freight - S | 787 | Harris Road | Te Irirangi | 1351 | 113 | 94 | 174 | 151 | 102 | 241 | Freight - S |
| | **AM - Pakuranga Rd to Pakuranga Highway and vice versa** | | | | | | | | | | | | | | | |
| | | | | | | | | Pakuranga Rd | | | | | | | | |
| 13284788 | Ti Rakau D | 201806 | 7:00-8:00 | 197 | Ti Rakau D | 1642 | Pakuranga Rd | Pakuranga Hwy | 341 | 135 | 77 | 205 | 99 | 56 | 183 | Ti Rakau D |
| | | | | | | | | Pakuranga Hwy | | | | | | | | |
| 13284787 | Ti Rakau D | 201806 | 7:00-8:00 | 196 | Ti Rakau D | 1641 | Pakuranga Hwy | Pakuranga Rd | 327 | 80 | 31 | 142 | 77 | 33 | 174 | Ti Rakau D |
| | **AM - Gossamer/Ti Rakau Dr to Pakuranga Rd** | | | | | | | | | | | | | | | |
| | | | | | | | | Ti Rakau Dr | | | | | | | | |
| 13284784 | Gossamer | 201806 | 7:00-8:00 | 164 | Gossamer | 1433 | Ti Rakau Dr | Chatsworth Cr / Ennis A | 645 | 52 | 47 | 181 | 56 | 48 | 155 | Gossamer |
| 13285866 | Gossamer | 201806 | 7:00-8:00 | 164 | Gossamer | 1434 | Chatsworth Cr / Ennis A | Reeves Rd | 395 | 35 | 29 | 51 | 40 | 34 | 80 | Gossamer |
| 13285870 | Gossamer | 201806 | 7:00-8:00 | 164 | Gossamer | 1435 | Reeves Rd | Larne Ave | 454 | 36 | 32 | 44 | 42 | 36 | 49 | Gossamer |
| 13285874 | Gossamer | 201806 | 7:00-8:00 | 164 | Gossamer | 1436 | Larne Ave | Pakuranga Rd | 601 | 73 | 53 | 154 | 170 | 81 | 559 | Gossamer |
| | **AM - Gossamer/Pakuranga Rd to Ti Rakau Dr** | | | | | | | | | | | | | | | |
| | | | | | | | | Pakuranga Rd | | | | | | | | |
| 13284796 | Gossamer | 201806 | 7:00-8:00 | 164 | Gossamer | 1436 | Pakuranga Rd | Larne Ave | 601 | 49 | 45 | 65 | 71 | 46 | 129 | Gossamer |
| 13285878 | Gossamer | 201806 | 7:00-8:00 | 164 | Gossamer | 1435 | Larne Ave | Reeves Rd | 454 | 48 | 38 | 57 | 48 | 39 | 82 | Gossamer |
| 13285882 | Gossamer | 201806 | 7:00-8:00 | 164 | Gossamer | 1434 | Reeves Rd | Chatsworth Cr / Ennis A | 395 | 29 | 25 | 33 | 35 | 28 | 104 | Gossamer |
| 13285886 | Gossamer | 201806 | 7:00-8:00 | 164 | Gossamer | 1433 | Chatsworth Cr / Ennis A | Ti Rakau Dr | 645 | 72 | 48 | 150 | 154 | 76 | 271 | Gossamer |
| | **AM - Bus** | | | | | | | | | | | | | | | |
| | | | | | | | | Botany Town Centre | | | | | | | | |
| 19206840 | | | | | | | Botany Town Centre | Panmure Interchange | | | | | | | | |
| | | | | | | | | Panmure Interchange | | | | | | | | |
| 19206842 | | | | | | | Panmure Interchange | Botany Town Centre | | | | | | | | |
| | | | | | | | | Cascades Road | | | | | | | | |
| 19206841 | | | | | | | Cascades Road | Panmure Interchange | | | | | | | | |
| | | | | | | | | Panmure Interchange | | | | | | | | |
| 19206843 | | | | | | | Panmure Interchange | Cascades Road | | | | | | | | |

| | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 0700-0800 | | | 0800-0900 | | | | | | 0 | 13284762 | | | | | | | | | | | | | | |
| Aimsun | Cumul Dis | Median Ti | 15th Perce | 85th Perce | Median Ti | 15th Perce | 85th Perce | 7:00-8:00 | 7:00-8:00 | 8:00-9:00 | 8:00-9:00 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | | | | |
| | | | | | | | | Av | Cummulative | Av | Cummulative | 7:15 | 7:30 | 7:45 | 8:00 | 8:15 | 8:30 | 8:45 | 9:00 | 9:15 | 9:30 | 9:45 | | | | |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | | | | | | | | | | |
| 13284775 | 2.436 | 5.55 | 3.966667 | 9.066667 | 4.966667 | 3.833333 | 7.433333 | 6.715237134 | 6.715237134 | 5.252887086 | 5.252887086 | 440.4762 | 381.5404 | 386.7261 | 394.8797 | 346.6544 | 275.7413 | 243.4176 | 189.8557 | 173.8853 | #N/A | #N/A | | | 100% | |
| 13284791 | 4.815 | 10.23333 | 7.316667 | 17.73333 | 9.133333 | 7.016667 | 13.43333 | 4.142544307 | 10.85778144 | 3.655526584 | 8.908413669 | 235.7302 | 255.7841 | 254.1436 | 225.1594 | 220.0202 | 226.7243 | 205.4225 | 196.219 | 190.8661 | #N/A | #N/A | | | | |
| 13285848 | 5.364 | 11.76667 | 8.333333 | 19.91667 | 10.58333 | 8.05 | 15.31667 | 1.496765815 | 12.35454726 | 1.445537407 | 10.35395108 | 87.71831 | 85.02526 | 96.67428 | 88.01156 | 95.77518 | 82.33967 | 80.80258 | 72.91596 | 66.866 | #N/A | #N/A | | | OK | OK |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | | | | | | | | | | |
| 13285849 | 0.549 | 1.15 | 0.783333 | 1.583333 | 1.033333 | 0.733333 | 1.483333 | 1.053888111 | 1.053888111 | 1.117161018 | 1.117161018 | 58.6654 | 61.37602 | 69.65844 | 71.0786 | 67.08065 | 67.206 | 62.7534 | 64.68988 | 64.66237 | #N/A | #N/A | | | | |
| 13284792 | 2.928 | 5.35 | 4.433333 | 6.966667 | 5.216667 | 4 | 6.5 | 3.473369498 | 4.527257609 | 3.586402588 | 4.703563606 | 216.1577 | 202.7737 | 206.2751 | 214.7854 | 219.6861 | 213.8163 | 212.4488 | 200.9834 | 209.5098 | #N/A | #N/A | | | | |
| 13284793 | 5.364 | 9.183333 | 7.3 | 11.86667 | 9.5 | 7.35 | 12.23333 | 3.815852882 | 8.343110491 | 3.698984091 | 8.402547697 | 217.0994 | 232.8622 | 236.892 | 228.2255 | 225.4598 | 217.3337 | 216.7372 | 214.5611 | 192.4057 | #N/A | #N/A | | | OK | OK |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | | | | | | | | | | |
| 13284776 | 1.351 | 2.35 | 1.716667 | 3.433333 | 3 | 2 | 4.816667 | 2.933602381 | 2.933602381 | 3.19143616 | 3.19143616 | 169.6078 | 178.2053 | 180.2353 | 165.015 | 180.2173 | 211.3492 | 209.3632 | 162.2794 | 155.0845 | #N/A | #N/A | | | | |
| 13285850 | 3.386 | 6.916667 | 4.433333 | 11.38333 | 6.6 | 4.766667 | 11 | 3.423284854 | 6.356887235 | 3.264148074 | 6.455584234 | 205.697 | 222.7637 | 187.7305 | 188.9014 | 195.8394 | 194.4593 | 204.1954 | 193.5673 | 173.2855 | #N/A | #N/A | | | | |
| 13284777 | 4.209 | 9.983333 | 6 | 15.73333 | 9.683333 | 6.383333 | 15.15 | 2.291097843 | 8.647985078 | 1.348770252 | 7.804354485 | 145.67 | 156.7759 | 109.9516 | 83.04348 | 80.13192 | 78.86989 | 81.65957 | 73.86161 | 67.44692 | #N/A | #N/A | | | | |
| 13284778 | 5.931 | 12 | 7.7 | 18.45 | 11.45 | 7.916667 | 17.41667 | 1.745327332 | 10.39331241 | 1.420618457 | 9.224972942 | 101.5622 | 110.9832 | 101.6135 | 86.12433 | 85.77199 | 84.06021 | 84.99189 | 84.51595 | 81.66155 | #N/A | #N/A | | | | |
| 13285851 | 6.757 | 13.7 | 8.716667 | 21 | 13.2 | 8.866667 | 20.43333 | 2.772824454 | 13.16613686 | 1.756137231 | 10.98111017 | 165.1919 | 167.087 | 166.8296 | 137.3861 | 101.8616 | 94.86441 | 87.36082 | 89.79646 | 83.38686 | #N/A | #N/A | | | | |
| 13284779 | 7.646 | 14.78333 | 9.6 | 22.28333 | 14.21667 | 9.716667 | 21.65 | 0.698891413 | 13.86502828 | 0.687764383 | 11.66887456 | 41.94585 | 41.78626 | 42.06834 | 41.99305 | 41.11108 | 40.7525 | 41.20683 | 40.54274 | 40.07985 | #N/A | #N/A | | | OK | OK |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | | | | | | | | | | |
| 13284780 | 0.889 | 1.016667 | 0.783333 | 2.283333 | 1 | 0.783333 | 2.633333 | 1.056718255 | 1.056718255 | 1.055825798 | 1.055825798 | 64.4477 | 61.61637 | 64.14522 | 63.33931 | 62.67607 | 64.38094 | 63.00186 | 64.30032 | 64.14703 | #N/A | #N/A | | | | |
| 13285861 | 1.715 | 1.916667 | 1.55 | 3.45 | 1.9 | 1.55 | 3.8 | 0.806079663 | 1.862797918 | 0.810367347 | 1.866193145 | 47.90932 | 47.77321 | 49.41181 | 48.5792 | 48.839 | 48.75928 | 48.31069 | 47.78683 | 46.38716 | #N/A | #N/A | | | | |
| 13284781 | 3.437 | 4.033333 | 3.183333 | 7.516667 | 4.933333 | 3.2 | 8.816667 | 2.97181444 | 4.834612359 | 3.396308137 | 5.262501282 | 165.7252 | 176.4436 | 192.7578 | 223.008 | 230.1351 | 196.8289 | 165.142 | 175.4729 | 163.554 | #N/A | #N/A | | | | |
| 13284782 | 4.26 | 5.133333 | 4.133333 | 9.566667 | 6.116667 | 4.216667 | 11.83333 | 1.00422865 | 5.838841009 | 1.010173131 | 6.272674413 | 61.77564 | 59.16104 | 59.82447 | 58.96715 | 60.55422 | 60.77331 | 62.14687 | 62.85486 | 58.27952 | #N/A | #N/A | | | | |
| 13284783 | 6.295 | 8.316667 | 6.533333 | 13.5 | 9.25 | 6.7 | 15.81667 | 3.348044962 | 9.186885971 | 4.072943874 | 10.34561829 | 192.2772 | 195.4956 | 214.8753 | 221.0975 | 230.4707 | 250.5756 | 275.3627 | 218.8658 | 207.7454 | #N/A | #N/A | | | | |
| 13285862 | 7.646 | 10.2 | 8.1 | 16.4 | 11.76667 | 8.4 | 19.83333 | 2.408427732 | 11.5953137 | 2.427727494 | 12.77334578 | 138.7867 | 140.4843 | 154.246 | 136.5582 | 143.505 | 149.0925 | 153.4989 | 150.2803 | 148.3059 | #N/A | #N/A | | | OK | OK |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | | | | | | | | | | |
| 13284788 | 0.341 | 2 | 1.283333 | 3.416667 | 2 | 0.933333 | 3.05 | 1.96656028 | 1.96656028 | 1.790551845 | 1.790551845 | 116.9302 | 118.2226 | 118.828 | 109.1476 | 111.1534 | 106.0589 | 103.3725 | 99.48425 | 82.47163 | #N/A | #N/A | | | OK | OK |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | | | | | | | | | | |
| 13284787 | 0.668 | 2 | 0.516667 | 2.366667 | 2 | 0.55 | 2.9 | 2.05992453 | 2.05992453 | 2.249934948 | 2.249934948 | 116.7869 | 116.8271 | 137.1725 | 131.714 | 134.9766 | 141.989 | 131.3048 | 110.9097 | 99.61536 | #N/A | #N/A | | | OK | OK |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | | | | | | | | | | |
| 13284784 | 0.645 | 0.866667 | 0.783333 | 3.016667 | 0.933333 | 0.8 | 2.583333 | 0.885232182 | 0.885232182 | 0.902051166 | 0.902051166 | 55.50934 | 52.24112 | 51.59133 | 54.12953 | 54.7835 | 55.25712 | 52.32212 | 53.18494 | 51.87362 | #N/A | #N/A | | | | |
| 13285866 | 1.04 | 1.45 | 1.266667 | 3.866667 | 1.6 | 1.366667 | 3.916667 | 0.664773858 | 1.55000604 | 0.659771456 | 1.561822622 | 41.07973 | 39.97202 | 38.60754 | 41.00231 | 40.60318 | 38.68965 | 38.05001 | 37.52435 | 37.64223 | #N/A | #N/A | | | | |
| 13285870 | 1.494 | 2.05 | 1.8 | 4.6 | 2.3 | 1.966667 | 4.733333 | 0.60098122 | 2.15098726 | 0.60318482 | 2.165007442 | 36.51309 | 35.9744 | 35.68913 | 36.02549 | 36.57902 | 36.22032 | 35.93953 | 35.81905 | 37.12194 | #N/A | #N/A | | | | |
| 13285874 | 2.095 | 3.266667 | 2.683333 | 7.166667 | 5.133333 | 3.316667 | 14.05 | 1.730070943 | 3.881058204 | 1.807190997 | 3.972198438 | 101.7532 | 106.0285 | 103.6311 | 109.0441 | 106.3685 | 112.0688 | 106.2444 | 101.6535 | 109.228 | #N/A | #N/A | | | OK | OK |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | | | | | | | | | | |
| 13284796 | 0.601 | 0.816667 | 0.75 | 1.083333 | 1.183333 | 0.766667 | 2.15 | 0.858634454 | 0.858634454 | 0.849688087 | 0.849688087 | 52.028 | 51.39223 | 51.13396 | 50.38556 | 52.03655 | 51.07142 | 50.43161 | 50.3199 | 49.06647 | #N/A | #N/A | | | | |
| 13285878 | 1.055 | 1.616667 | 1.383333 | 2.033333 | 1.983333 | 1.416667 | 3.516667 | 0.775669683 | 1.634304137 | 0.750392167 | 1.600080254 | 48.23595 | 46.50015 | 44.88444 | 44.30616 | 46.71995 | 44.74986 | 44.31815 | 42.05678 | 42.01707 | #N/A | #N/A | | | | |
| 13285882 | 1.45 | 2.1 | 1.8 | 2.583333 | 2.566667 | 1.883333 | 5.25 | 0.516202321 | 2.150506458 | 0.515693172 | 2.115773427 | 31.00559 | 30.9713 | 30.93953 | 30.90586 | 31.1137 | 31.00629 | 30.74051 | 31.04925 | 30.96776 | #N/A | #N/A | | | | |
| 13285886 | 2.095 | 3.3 | 2.6 | 5.083333 | 5.133333 | 3.15 | 9.766667 | 1.696491139 | 3.846997598 | 1.797266661 | 3.913040088 | 92.74557 | 110.0827 | 102.5401 | 112.0977 | 105.9941 | 110.7331 | 102.5192 | 98.72786 | 104.3459 | #N/A | #N/A | | | OK | OK |
| | | Median Ti | 15th Perce | 85th Perce | Median Ti | 15th Perce | 85th Percentile (s) | | | | 3 | | | | | | | | | | | | | | | |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | | | | | | | | | | |
| 19206840 | 7.63 | 38.83333 | 30.23333 | 47.01667 | 27.63333 | 25.22 | 36.31667 | 30.03937771 | 30.03937771 | 29.06571162 | 29.06571162 | 1750.953 | 1795.066 | 1861.068 | 1743.562 | 1752.677 | 1801.477 | 1678.054 | 1813.218 | 1700.757 | #N/A | #N/A | | | | |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | | | | | | | | | | |
| 19206842 | 7.638 | 27.28333 | 20.11667 | 32.88333 | 30 | 18 | 32 | 26.22906907 | 26.22906907 | 28.09448037 | 28.09448037 | 1544.36 | 1496.846 | 1680.026 | 1576.824 | 1668.109 | 1721.432 | 1776.311 | 1604.345 | 1496.002 | #N/A | #N/A | | | | |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | | | | | | | | | | |
| 19206841 | 4.962 | 20.71667 | 17.46667 | 25.39167 | 20.71667 | 17.46667 | 25.39167 | 22.92836997 | 22.92836997 | 22.59312132 | 22.59312132 | 1373.438 | 1380.146 | 1373.523 | 1325.09 | 1426.063 | 1336.073 | 1335.122 | 1266.16 | 1056.849 | #N/A | #N/A | | | | |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | | | | | | | | | | |
| 19206843 | 4.897 | 18 | 9.533333 | 19 | 18 | 10.66167 | 19 | 16.49977349 | 16.49977349 | 16.96103015 | 16.96103015 | 988.45 | 973.2352 | 1008.274 | 1020.141 | 1027.344 | 1026.23 | 996.9319 | 986.3285 | 962.0151 | #N/A | #N/A | | | | |

# PM

| | | | | | | | | | | 1600-1700 | | | 1700-1800 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Aimsun | Route Nar | Year_Mon | Period | Route ID | Route Nar | Seg ID | From | To | Length | Median Ti | 15th Perce | 85th Percentile (s | Median Ti | 15th Perce | 85th Perce |
| | **PM - Pakuranga Rd/Cascades Rd to Mt W Hwy** | | | | | | | | | | | | | | |
| | | | | | | | | Cascades Road | | | | | | | |
| 13284775 | Ellerslie P | 201806 | 7:00-8:00 | 55 | Ellerslie P | 795 | Cascades Road | Ti Rakau Drive | 2436 | 204 | 178 | 271 | 213 | 175 | 307 |
| 13284791 | Ellerslie P | 201806 | 7:00-8:00 | 55 | Ellerslie P | 796 | Ti Rakau Drive | Jellicoe Road | 2379 | 214 | 184 | 267 | 231 | 193 | 292 |
| 13285848 | Ellerslie P | 201806 | 7:00-8:00 | 55 | Ellerslie P | 797 | Jellicoe Road | Mt W Hwy | 549 | 77 | 51 | 122 | 80 | 48 | 153 |
| | **PM - Pakuranga Rd/ Mt W Hwy to Cascades Rd** | | | | | | | | | | | | | | |
| | | | | | | | | Mt W Hwy | | | | | | | |
| 13285849 | Ellerslie P | 201806 | 7:00-8:00 | 193 | Ellerslie P | 1628 | Mt Wellington Highwa | Jellicoe Road | 549 | 157 | 84 | 228 | 243 | 164 | 312 |
| 13284792 | Ellerslie P | 201806 | 7:00-8:00 | 193 | Ellerslie P | 1629 | Jellicoe Road | Ti Rakau Drive | 2379 | 287 | 208 | 422 | 469 | 295 | 767 |
| 13284793 | Ellerslie P | 201806 | 7:00-8:00 | 193 | Ellerslie P | 1630 | Ti Rakau Drive | Cascades Road | 2436 | 248 | 209 | 331 | 379 | 303 | 463 |
| | **PM - Ti Rakau Dr/Te Irirangi Dr to Mt W Hwy** | | | | | | | | | | | | | | |
| | | | | | | | | Te Irirangi | | | | | | | |
| 13284776 | Ellerslie P | 201806 | 7:00-8:00 | 193 | Ellerslie P | 1638 | Te Irirangi | Harris Road | 1351 | 164 | 117 | 227 | 186 | 122 | 347 |
| 13285850 | Freight - S | 201806 | 7:00-8:00 | 32 | Freight - S | 286 | Harris Road | Edgewater Drive | 2035 | 237 | 179 | 356 | 260 | 188 | 424 |
| 13284777 | Freight - S | 201806 | 7:00-8:00 | 32 | Freight - S | 287 | Edgewater Drive | Ti Rakau Dr | 823 | 167 | 92 | 296 | 168 | 87 | 457 |
| 13284778 | Freight - S | 201806 | 7:00-8:00 | 32 | Freight - S | 288 | Ti Rakau Dr | Pakuranga Highway | 1722 | 93 | 83 | 136 | 91 | 77 | 129 |
| 13285851 | Freight - S | 201806 | 7:00-8:00 | 32 | Freight - S | 289 | Pakuranga Highway | Carbine Road | 826 | 50 | 41 | 99 | 54 | 43 | 80 |
| 13284779 | Freight - S | 201806 | 7:00-8:00 | 32 | Freight - S | 290 | Carbine Road | SH1 | 889 | 53 | 45 | 61 | 51 | 43 | 63 |
| | **PM - Ti Rakau Dr/Mt W Hwy to Te Irirangi Dr** | | | | | | | | | | | | | | |
| | | | | | | | | SH1 | | | | | | | |
| 13284780 | Freight - S | 201806 | 7:00-8:00 | 32 | Freight - S | 290 | SH1 | Carbine Road | 889 | 114 | 69 | 178 | 219 | 124 | 327 |
| 13285861 | Freight - S | 201806 | 7:00-8:00 | 32 | Freight - S | 289 | Carbine Road | Pakuranga Highway | 826 | 80 | 54 | 146 | 153 | 96 | 203 |
| 13284781 | Freight - S | 201806 | 7:00-8:00 | 32 | Freight - S | 288 | Pakuranga Highway | Ti Rakau Dr | 1722 | 170 | 121 | 237 | 222 | 160 | 297 |
| 13284782 | Freight - S | 201806 | 7:00-8:00 | 32 | Freight - S | 287 | Ti Rakau Dr | Edgewater Drive | 823 | 71 | 60 | 192 | 83 | 61 | 178 |
| 13284783 | Freight - S | 201806 | 7:00-8:00 | 32 | Freight - S | 286 | Edgewater Drive | Harris Road | 2035 | 371 | 215 | 537 | 512 | 326 | 680 |
| 13285862 | Ellerslie P | 201806 | 7:00-8:00 | 32 | Freight - S | 787 | Harris Road | Te Irirangi | 1351 | 210 | 156 | 309 | 269 | 167 | 406 |
| | **PM - Pakuranga Rd to Pakuranga Highway and vice versa** | | | | | | | | | | | | | | |
| | | | | | | | | Pakuranga Rd | | | | | | | |
| 13284788 | Ti Rakau D | 201806 | 7:00-8:00 | 197 | Ti Rakau D | 1642 | Pakuranga Rd | Pakuranga Hwy | 341 | 147 | 48 | 279 | 141 | 78 | 238 |
| | | | | | | | | Pakuranga Hwy | | | | | | | |
| 13284787 | Ti Rakau D | 201806 | 7:00-8:00 | 196 | Ti Rakau D | 1641 | Pakuranga Hwy | Pakuranga Rd | 327 | 107 | 37 | 129 | 123 | 60 | 153 |
| | **PM - Gossamer/Ti Rakau Dr to Pakuranga Rd** | | | | | | | | | | | | | | |
| | | | | | | | | Ti Rakau Dr | | | | | | | |
| 13284784 | Gossamer | 201806 | 7:00-8:00 | 164 | Gossamer | 1433 | Ti Rakau Dr | Chatsworth Cr / Ennis A | 645 | 52 | 49 | 58 | 52 | 49 | 63 |
| 13285866 | Gossamer | 201806 | 7:00-8:00 | 164 | Gossamer | 1434 | Chatsworth Cr / Ennis A | Reeves Rd | 395 | 36 | 30 | 40 | 34 | 27 | 50 |
| 13285870 | Gossamer | 201806 | 7:00-8:00 | 164 | Gossamer | 1435 | Reeves Rd | Larne Ave | 454 | 37 | 34 | 41 | 41 | 35 | 87 |
| 13285874 | Gossamer | 201806 | 7:00-8:00 | 164 | Gossamer | 1436 | Larne Ave | Pakuranga Rd | 601 | 129 | 82 | 193 | 223 | 109 | 385 |
| | **PM - Gossamer/Pakuranga Rd to Ti Rakau Dr** | | | | | | | | | | | | | | |
| | | | | | | | | Pakuranga Rd | | | | | | | |
| 13284796 | Gossamer | 201806 | 7:00-8:00 | 164 | Gossamer | 1436 | Pakuranga Rd | Larne Ave | 601 | 48 | 44 | 111 | 49 | 44 | 56 |
| 13285878 | Gossamer | 201806 | 7:00-8:00 | 164 | Gossamer | 1435 | Larne Ave | Reeves Rd | 454 | 42 | 38 | 49 | 45 | 34 | 53 |
| 13285882 | Gossamer | 201806 | 7:00-8:00 | 164 | Gossamer | 1434 | Reeves Rd | Chatsworth Cr / Ennis A | 395 | 31 | 27 | 37 | 32 | 27 | 45 |
| 13285886 | Gossamer | 201806 | 7:00-8:00 | 164 | Gossamer | 1433 | Chatsworth Cr / Ennis A | Ti Rakau Dr | 645 | 56 | 45 | 93 | 57 | 45 | 107 |
| | **AM - Bus** | | | | | | | | | | | | | | |
| | | | | | | | | Botany Town Centre | | | | | | | |
| 19206840 | | | | | | | Botany Town Centre | Panmure Interchange | | | | | | | |
| | | | | | | | | Panmure Interchange | | | | | | | |
| 19206842 | | | | | | | Panmure Interchange | Botany Town Centre | | | | | | | |
| | | | | | | | | Cascades Road | | | | | | | |
| 19206841 | | | | | | | Cascades Road | Panmure Interchange | | | | | | | |
| | | | | | | | | Panmure Interchange | | | | | | | |
| 19206843 | | | | | | | Panmure Interchange | Cascades Road | | | | | | | |

| | | | 1600-1700 | | | 1700-1800 | | | | | | 0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Aimsun | Route Nar | Cumul Dis | Median Ti | 15th Perce | 85th Perce | Median Ti | 15th Perce | 85th Perce | 16:00-17:00 | 16:00-17:00 | 17:00-18:00 | 17:00-18:00 |
| | | | | | | | | | Av | Cummulative | Av | Cummulative |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 13284775 | Ellerslie P | 2.436 | 3.4 | 2.966667 | 4.516667 | 3.55 | 2.916667 | 5.116667 | 3.672386476 | 3.672386476 | 3.729485955 | 3.729485955 |
| 13284791 | Ellerslie P | 4.815 | 6.966667 | 6.033333 | 8.966667 | 7.4 | 6.133333 | 9.983333 | 2.966762449 | 6.639148926 | 2.960384108 | 6.689870063 |
| 13285848 | Ellerslie P | 5.364 | 8.25 | 6.883333 | 11 | 8.733333 | 6.933333 | 12.53333 | 1.175093382 | 7.814242308 | 1.176770011 | 7.866640074 |
| | | | | | | | | | | | | |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 13285849 | Ellerslie P | 0.549 | 2.616667 | 1.4 | 3.8 | 4.05 | 2.733333 | 5.2 | 1.351156253 | 1.351156253 | 1.551183367 | 1.551183367 |
| 13284792 | Ellerslie P | 2.928 | 7.4 | 4.866667 | 10.83333 | 11.86667 | 7.65 | 17.98333 | 3.949620592 | 5.300776845 | 5.512754337 | 7.063937704 |
| 13284793 | Ellerslie P | 5.364 | 11.53333 | 8.35 | 16.35 | 18.18333 | 12.7 | 25.7 | 3.959955448 | 9.260732294 | 5.102215299 | 12.166153 |
| | | | | | | | | | | | | |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 13284776 | Ellerslie P | 1.351 | 2.733333 | 1.95 | 3.783333 | 3.1 | 2.033333 | 5.783333 | 2.996646152 | 2.996646152 | 2.854877477 | 2.854877477 |
| 13285850 | Freight - S | 3.386 | 6.683333 | 4.933333 | 9.716667 | 7.433333 | 5.166667 | 12.85 | 3.184632109 | 6.181278262 | 3.37198965 | 6.226867127 |
| 13284777 | Freight - S | 4.209 | 9.466667 | 6.466667 | 14.65 | 10.23333 | 6.616667 | 20.46667 | 1.671360645 | 7.852638906 | 2.542705856 | 8.769572983 |
| 13284778 | Freight - S | 5.931 | 11.01667 | 7.85 | 16.91667 | 11.75 | 7.9 | 22.61667 | 1.284673323 | 9.13731223 | 1.28951806 | 10.05909104 |
| 13285851 | Freight - S | 6.757 | 11.85 | 8.533333 | 18.56667 | 12.65 | 8.616667 | 23.95 | 1.22097178 | 10.35828401 | 1.323229088 | 11.38232013 |
| 13284779 | Freight - S | 7.646 | 12.73333 | 9.283333 | 19.58333 | 13.5 | 9.333333 | 25 | 0.626877309 | 10.98516132 | 0.638241363 | 12.02056149 |
| | | | | | | | | | | | | |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 13284780 | Freight - S | 0.889 | 1.9 | 1.15 | 2.966667 | 3.65 | 2.066667 | 5.45 | 1.345064957 | 1.345064957 | 3.374359507 | 3.374359507 |
| 13285861 | Freight - S | 1.715 | 3.233333 | 2.05 | 5.4 | 6.2 | 3.666667 | 8.833333 | 1.433112498 | 2.778177455 | 3.232694485 | 6.607053992 |
| 13284781 | Freight - S | 3.437 | 6.066667 | 4.066667 | 9.35 | 9.9 | 6.333333 | 13.78333 | 3.491659509 | 6.269836964 | 4.207693114 | 10.81474711 |
| 13284782 | Freight - S | 4.26 | 7.25 | 5.066667 | 12.55 | 11.28333 | 7.35 | 16.75 | 1.114326877 | 7.384163841 | 1.23034951 | 12.04509662 |
| 13284783 | Freight - S | 6.295 | 13.43333 | 8.65 | 21.5 | 19.81667 | 12.78333 | 28.08333 | 6.694758894 | 14.07892274 | 7.87886034 | 19.92395696 |
| 13285862 | Freight - S | 7.646 | 16.93333 | 11.25 | 26.65 | 24.3 | 15.56667 | 34.85 | 3.981469813 | 18.06039255 | 5.038878356 | 24.96283531 |
| | | | | | | | | | | | | |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 13284788 | Ti Rakau D | 0.341 | 2 | 0.8 | 4.65 | 2 | 1.3 | 3.966667 | 1.702532323 | 1.702532323 | 1.771228996 | 1.771228996 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 13284787 | Ti Rakau D | 0.668 | 1.783333 | 0.616667 | 2.15 | 2.05 | 1 | 2.55 | 1.969262132 | 1.969262132 | 1.906575235 | 1.906575235 |
| | | | | | | | | | | | | |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 13284784 | Gossamer | 0.645 | 0.866667 | 0.816667 | 0.966667 | 0.866667 | 0.816667 | 1.05 | 0.924053235 | 0.924053235 | 0.930076103 | 0.930076103 |
| 13285866 | Gossamer | 1.04 | 1.466667 | 1.316667 | 1.633333 | 1.433333 | 1.266667 | 1.883333 | 0.644485482 | 1.568538716 | 0.646303777 | 1.576379881 |
| 13285870 | Gossamer | 1.494 | 2.083333 | 1.883333 | 2.316667 | 2.116667 | 1.85 | 3.333333 | 0.61376967 | 2.182308387 | 0.614425966 | 2.190805847 |
| 13285874 | Gossamer | 2.095 | 4.233333 | 3.25 | 5.533333 | 5.833333 | 3.666667 | 9.75 | 1.644612721 | 3.826921107 | 1.692846159 | 3.883652006 |
| | | | | | | | | | | | | |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 13284796 | Gossamer | 0.601 | 0.8 | 0.733333 | 1.85 | 0.816667 | 0.733333 | 0.933333 | 0.801570582 | 0.801570582 | 0.810898816 | 0.810898816 |
| 13285878 | Gossamer | 1.055 | 1.5 | 1.366667 | 2.666667 | 1.566667 | 1.3 | 1.816667 | 0.681652994 | 1.483223576 | 0.684442075 | 1.495340891 |
| 13285882 | Gossamer | 1.45 | 2.016667 | 1.816667 | 3.283333 | 2.1 | 1.75 | 2.566667 | 0.50957196 | 1.992795536 | 0.508546463 | 2.003887354 |
| 13285886 | Gossamer | 2.095 | 2.95 | 2.566667 | 4.833333 | 3.05 | 2.5 | 4.35 | 2.049160027 | 4.041955563 | 1.785142203 | 3.789029557 |
| | | | Median Ti | 15th Perce | 85th Perce | Median Ti | 15th Perce | 85th Percentile (s) | | | | 3 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 19206840 | | 7.63 | 32 | 24.98333 | 39.31667 | 29.91667 | 27.06 | 36.1 | 34.31789006 | 34.31789006 | 41.77545029 | 41.77545029 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 19206842 | | 7.638 | 31.69167 | 27.475 | 43 | 31 | 19.33333 | 38.23333 | 30.07516254 | 30.07516254 | 35.98015616 | 35.98015616 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 19206841 | | 4.962 | 18 | 16 | 23 | 18 | 16 | 23 | 17.94052257 | 17.94052257 | 17.82903687 | 17.82903687 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 19206843 | | 4.897 | 20 | 11.26333 | 23 | 21 | 11.31333 | 25 | 17.64189456 | 17.64189456 | 19.31552166 | 19.31552166 |

| | 13284835 | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Aimsun | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | | | |
| | 16:00 | 16:15 | 16:30 | 16:45 | 17:00 | 17:15 | 17:30 | 17:45 | 18:00 | 18:15 | 18:30 | 18:45 | | | |
| 13284775 | 219.7794 | 218.2562 | 222.9939 | 226.2317 | 217.7831 | 228.5905 | 222.4713 | 219.5799 | 223.4172 | 215.0311 | #N/A | #N/A | | 81% | |
| 13284791 | 176.9659 | 181.8054 | 175.2459 | 177.8604 | 178.8053 | 177.8888 | 175.9376 | 173.5232 | 174.5689 | 175.7231 | #N/A | #N/A | | | |
| 13285848 | 69.3579 | 72.02161 | 70.13729 | 70.38239 | 70.37246 | 70.56143 | 71.10852 | 69.54756 | 67.61011 | 63.14393 | #N/A | #N/A | | OK | OK |
| 13285849 | 74.34868 | 83.82057 | 85.03887 | 93.89767 | 90.84426 | 98.01386 | 89.52822 | 78.86495 | 74.08614 | 68.25999 | #N/A | #N/A | | | |
| 13284792 | 229.5614 | 233.9628 | 247.4075 | 280.642 | 302.7486 | 340.5109 | 399.1595 | 481.6804 | 467.5166 | 432.7425 | #N/A | #N/A | | | |
| 13284793 | 213.8126 | 231.8755 | 267.1039 | 285.2944 | 293.0839 | 320.1452 | 326.0083 | 310.9813 | 307.0724 | 271.7908 | #N/A | #N/A | | OK | :( |
| 13284776 | 174.9167 | 184.412 | 180.0675 | 172.4086 | 162.0063 | 180.2206 | 170.5351 | 174.2074 | 172.8762 | 179.1294 | #N/A | #N/A | | | |
| 13285850 | 175.6967 | 193.4484 | 204.0887 | 191.3311 | 202.0108 | 208.2878 | 207.6479 | 241.3509 | 287.7392 | 292.7797 | #N/A | #N/A | | | |
| 13284777 | 84.0801 | 95.02923 | 121.7356 | 180.4905 | 142.2249 | 136.2698 | 151.2642 | 170.808 | 195.1949 | 170.1465 | #N/A | #N/A | | | |
| 13284778 | 76.93013 | 76.58362 | 77.72745 | 77.78598 | 77.66823 | 77.33698 | 76.69314 | 76.5434 | 76.23417 | 76.29361 | #N/A | #N/A | | | |
| 13285851 | 67.99326 | 70.93437 | 80.8473 | 80.82416 | 79.77451 | 79.69257 | 77.28374 | 75.41792 | 78.31787 | 73.91309 | #N/A | #N/A | | | |
| 13284779 | 37.17142 | 37.252 | 38.4145 | 38.37633 | 38.7038 | 38.33495 | 37.76285 | 37.56767 | 37.53474 | 37.50876 | #N/A | #N/A | | OK | OK |
| 13284780 | 75.48622 | 80.01641 | 86.60906 | 165.3861 | 208.0027 | 212.9573 | 223.5001 | 197.6962 | 198.629 | 196.575 | #N/A | #N/A | | | |
| 13285861 | 55.36503 | 67.54587 | 135.0493 | 194.4563 | 189.6552 | 196.2735 | 195.4616 | 180.5886 | 182.8227 | 197.316 | #N/A | #N/A | | | |
| 13284781 | 174.3283 | 211.5984 | 242.572 | 250.3782 | 250.1193 | 262.7635 | 246.5854 | 245.3859 | 254.4818 | 268.6982 | #N/A | #N/A | | | |
| 13284782 | 66.68746 | 68.36258 | 65.52881 | 68.19181 | 72.22885 | 78.83919 | 76.02403 | 80.6121 | 82.86103 | 79.03827 | #N/A | #N/A | | | |
| 13284783 | 348.2213 | 405.0955 | 451.7397 | 464.8879 | 510.9525 | 468.521 | 446.5651 | 465.3191 | 460.2442 | 472.3467 | #N/A | #N/A | | | |
| 13285862 | 219.9947 | 233.6889 | 262.9809 | 300.5452 | 314.9621 | 301.3707 | 292.4528 | 290.3868 | 253.6829 | 194.2535 | #N/A | #N/A | | OK | OK |
| 13284788 | 99.2407 | 102.8184 | 104.3967 | 108.1075 | 109.1288 | 106.201 | 101.6576 | 103.6174 | 104.8745 | 100.1289 | #N/A | #N/A | | OK | OK |
| 13284787 | 116.596 | 117.7154 | 120.1557 | 116.0114 | 121.3794 | 100.5643 | 119.623 | 130.1888 | 119.8587 | 107.1413 | #N/A | #N/A | | OK | OK |
| 13284784 | 55.55813 | 55.03185 | 55.7396 | 55.13666 | 55.70274 | 56.54814 | 55.83073 | 55.61799 | 55.23948 | 55.08163 | #N/A | #N/A | | | |
| 13285866 | 38.7924 | 38.22575 | 38.98924 | 38.59636 | 38.58211 | 39.37888 | 38.55556 | 38.67347 | 38.43066 | 38.22625 | #N/A | #N/A | | | |
| 13285870 | 37.3418 | 36.691 | 36.44574 | 37.09026 | 36.69769 | 36.90775 | 36.76654 | 36.68242 | 36.80475 | 36.80433 | #N/A | #N/A | | | |
| 13285874 | 99.7732 | 99.20631 | 97.05078 | 97.6546 | 99.17301 | 106.5627 | 102.8928 | 98.85815 | 100.4477 | 102.5011 | #N/A | #N/A | | OK | :( |
| 13284796 | 48.24005 | 48.1795 | 47.86315 | 47.8039 | 48.45717 | 49.34373 | 49.01092 | 48.25483 | 48.78706 | 48.65613 | #N/A | #N/A | | | |
| 13285878 | 41.40261 | 40.16048 | 41.13445 | 41.0816 | 41.20696 | 40.86016 | 41.11738 | 40.8232 | 41.2704 | 40.67774 | #N/A | #N/A | | | |
| 13285882 | 30.51677 | 30.62805 | 30.57813 | 30.60602 | 30.45761 | 30.57072 | 30.4168 | 30.46105 | 30.8859 | 30.72589 | #N/A | #N/A | | | |
| 13285886 | 125.381 | 113.1702 | 130.2976 | 82.40907 | 113.6328 | 120.0437 | 112.3486 | 95.27297 | 118.8606 | 120.795 | #N/A | #N/A | | :( | OK |
| 19206840 | 2019.738 | 2115.785 | 2041.696 | 2286.365 | 2434.836 | 2614.659 | 2690.249 | 2574.8 | 2622.602 | 2650.862 | #N/A | | | | |
| 19206842 | 1584.004 | 1851.134 | 1978.392 | 2015.969 | 2178.627 | 2190.471 | 2250.17 | 2335.352 | 2289.128 | 2437.627 | #N/A | | | | |
| 19206841 | 1047.784 | 1124.981 | 1056.529 | 1109.705 | 1081.476 | 1034.967 | 1052.821 | 1027.834 | 1035.117 | 1017.107 | #N/A | | | | |
| 19206843 | 1061.597 | 1026.393 | 1087.55 | 1117.556 | 1133.384 | 1166.271 | 1218.514 | 1238.809 | 1235.37 | 1233.232 | #N/A | | | | |