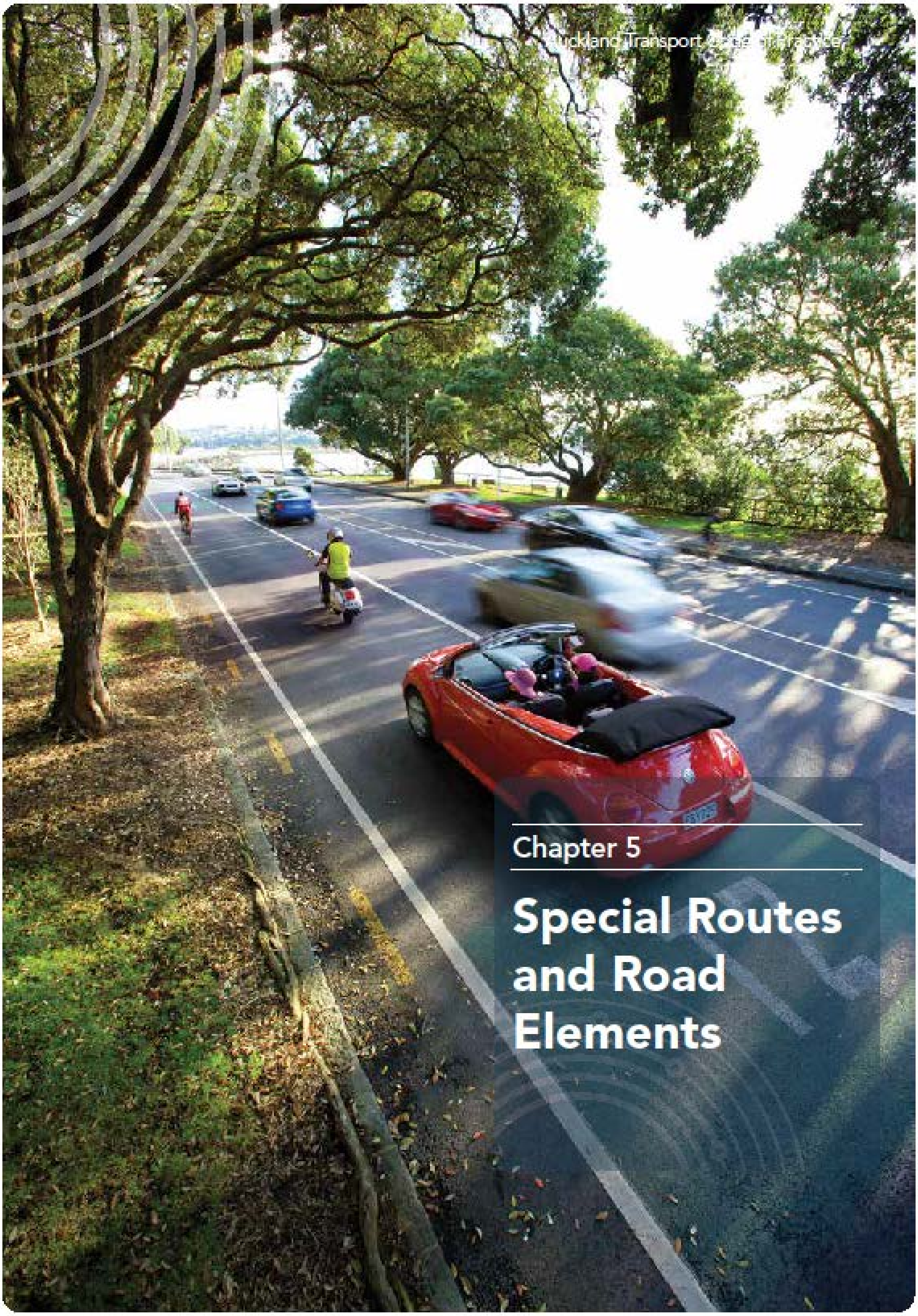

Chapter 5
Special Routes and Road Elements

# 5 Special Routes and Road Elements

## 5.1 Bus and Transit Lanes

### 5.1.1 Introduction

With increasing demand for travel and limited opportunities for increasing capacity within urban areas, there is a need to make more effective use of the available road space. An effective approach is to introduce bus and transit lanes on key routes.

The Bus and Transit Lane Review: Planning and Implementation Model for Auckland, July 2011 document produced by Auckland transport was endorsed for application by the Auckland Transport Board in July 2011. The overall objective is to ensure that all bus and transit lanes introduced effectively enhance the overall performance of the particular route, and that these conform closely to standard templates, no matter who has completed the design or where they are located within the Auckland region.

The document sets out to establish two key elements related to bus and transit lanes; namely:

- A policy that aligns with strategic planning objectives and provides an analytical basis for the implementation of bus and transit lanes for the Auckland region;
- Standard templates for bus and transit lanes, generic to all locations, to be used for bus and transit lanes across the Auckland region.

This document forms the basis of this chapter and looks to addresses the following:

- WHY transit lanes may be necessary;
- WHERE should these be introduced;
- WHEN should a bus or transit lane be introduced; and finally
- HOW these are to be physically represented on the ground.

It should be noted that application of the policy is underway and the physical implementation of bus and transit lanes is currently being trialled using standard templates thusfar developed. As a result, some elements of this document may be subject to review following the outcomes of the trials.

### 5.1.2 Policy

The adopted policy provides both transparency and guidance to the implementation of appropriate bus or transit lanes, and looks to balance current traffic operations with strategic aspirations, without unduly compromising either. The policy includes assessment criteria and a decision flow diagram developed to simplify the assessment process, with a purpose to better inform decision-making around the performance of bus and transit lanes.

#### 5.1.2.1 Setting the Scene and Context – WHY?

Future growth is inevitable, and economic growth can be supported and enhanced through an effective and reliable transport system. Auckland is currently home to 33% of NZ's population, increasing at 1.5% per annum, and is expected to comprise 40% of NZ's population by 2041.

International research shows successful, modern nations are sustained by prosperous and successful cities. Successful cities in turn require transport networks and systems that move people and goods as effectively and efficiently as possible, and in a way that is sustainable going forward. In terms of people movement, this translates to an effective and efficient public transport (PT) system that is able to accommodate the future demands of a growing city.

The Auckland Plan is the city's leading strategic document, and the Integrated Transport Programme (ITP) has been developed by Auckland Transport to give effect to the Auckland Plan's vision. The Plan includes a number of outcomes, transformational shifts and strategic directions that are directly relevant to Auckland's transport system. The ITP's strategic framework was also developed in reference to the Government Policy Statement on Land Transport Funding (GPS).

The GPS sets out central government's outcomes and priorities for the land transport sector. Its overarching goal for transport is – *An effective, efficient, safe, secure, accessible and resilient transport system that supports the growth of our country's economy in order to deliver greater prosperity, security and opportunities for all New Zealanders* – and its focus areas over the next 10 years are:

- Economic growth and productivity
- Value for money
- Road safety.

In response to these strategic requirements of Auckland Council and central government, the overarching outcome in the ITP is: Auckland's transport system is effective, efficient and provides for the region's social, economic, environmental and cultural wellbeing. Its six supporting impacts are:

- Better use of transport resources to maximise return on existing assets
- Auckland's transport network moves people and goods efficiently
- Increased access to a wider range of transport choices
- Improved safety of Auckland's transport system
- Reduced adverse environmental effects from Auckland's transport system
- Auckland's transport network effectively connects communities and provides for Auckland's compact urban form.

While much has been achieved in recent years to improve the capacity and safety of Auckland's transport networks, the system remains highly reliant on a heavily used road network and demand for travel is expected to increase significantly as the city's population grows rapidly.

Looking ahead 40-50 years, Auckland's transport system will require a PT network that can carry at least 200 million passenger trips annually between regional centres, at high frequencies with reliable travel times. The Auckland Plan sets challenging patronage targets, while the results of transport modelling for the Integrated Transport Programme highlight the critical importance of dramatically improving Auckland's PT network to avoid future gridlock.

To achieve these objectives, the Rapid Transit Network (RTN) is to be expanded and greater ease of travel for PT on several key arterials is to be provided particularly on the Frequent PT Network. By having regional routes comprising only general vehicle lanes, means that the people movement capability remains relatively capped and limited. With road widening opportunities largely limited, increased efficiency of the available road space can best be achieved by increased PT patronage and increased vehicle occupancies.

Enabling greater ease of travel for these higher occupant modes through the implementation of bus and transit lanes, significantly enhances the road network efficiency in terms of the movement of people through the network.

It is in this context that bus and transit lanes are both beneficial and necessary, both now and into the future.

#### *5.1.2.2 The Auckland Plan – WHERE?*

The ITP has identified key strategies to give effect to the Auckland Plan, and includes the development of a principal PT network to accommodate PT demand into the future.

In broad terms, the PT network comprises the following elements and represented diagrammatically in Figure 10:

- a Rapid Transit Network (RTN), which consists of the rail network and the Northern Busway,
- a Frequent PT Network (FTN) comprising extensive bus networks with high frequency of services throughout the day,
- a Connector PT Network, providing area-wide coverage and connecting to the RTN and/or the FTN
- a Local Connector Network (LCN), primarily local bus services.

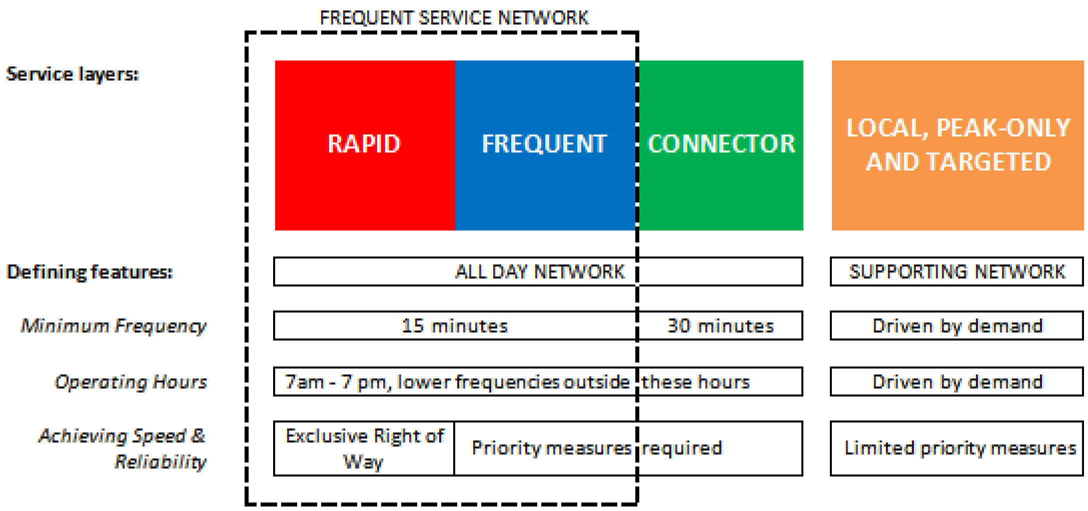



**Figure 10: PT Network**

The main implications would be for in-corridor bus services especially on the Frequent Service Network which is quite extensive and is likely to need priority measures. Similarly, some Connector services and peak-only services on specific corridors may also warrant priority measures.

The PT network as represented in the ITP, is shown in Figure 11.

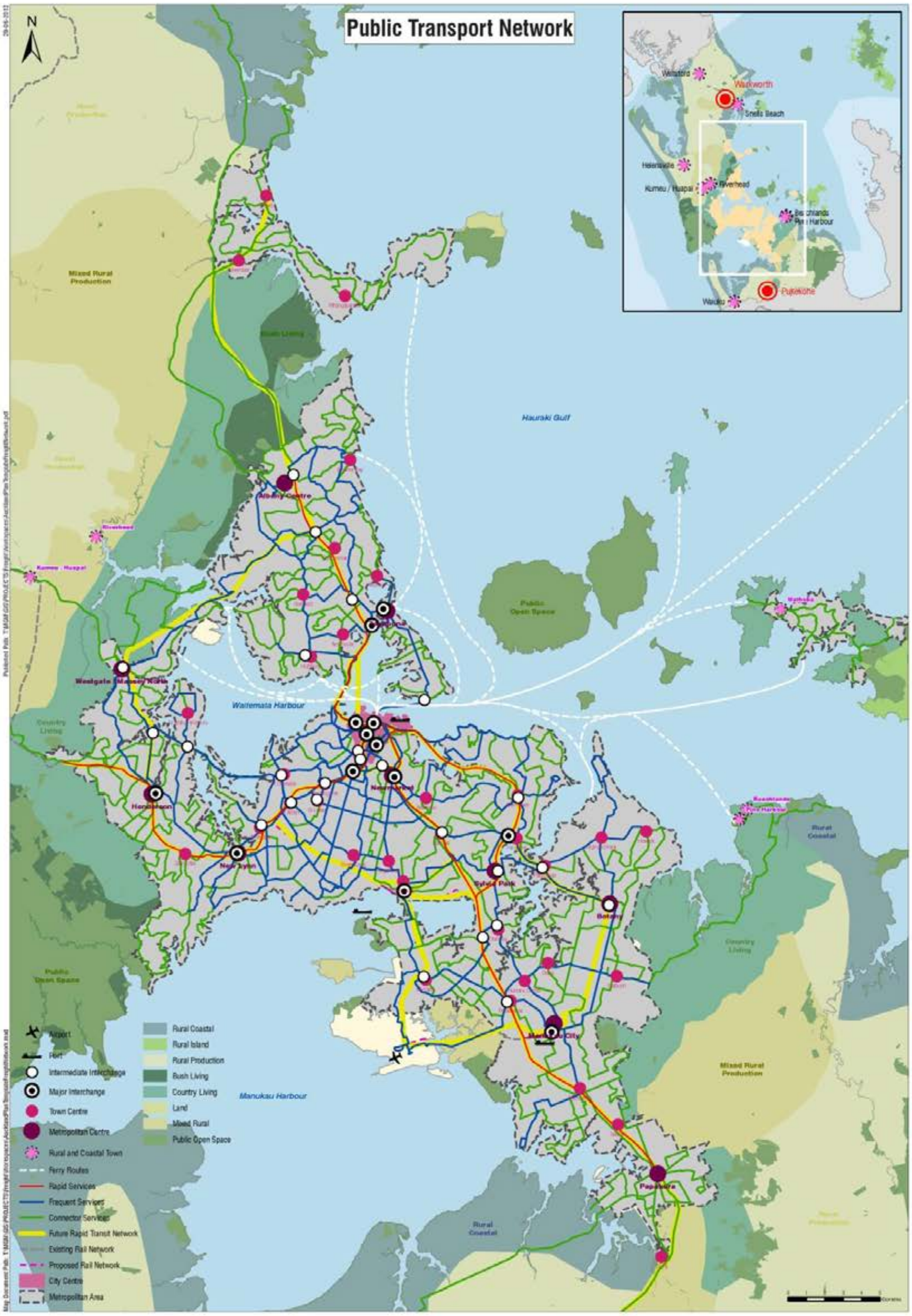



**Figure 11: PT Network as Represented in the ITP**

On PT emphasis routes, it is anticipated that bus lanes will be implemented at some stage in the future, if not already present.

Furthermore, not all primary arterials form part of the PT network, and therefore not all primary arterials are expected to include bus lanes. This is primarily related to the priorities assigned by the Regional Arterial Road Plan (RARP), which aims to establish an effective transport system for Auckland, encompassing not only the PT network but also cycle, pedestrian, freight and general vehicle movements. However, in the longer term, it is likely that a significant number of primary arterials will have bus or transit lanes, given the higher people carrying capacity of these lanes.

### *5.1.2.3 Assessment Criteria – WHEN?*

With increasing demand for travel and limited opportunities for increasing capacity within urban areas in Auckland, there is increasing pressure to ensure that effective use of the available capacity on the road network is made. This is particularly relevant with respect to the introduction of bus lanes, since the related road network or road corridor efficiency is not always apparent to road users and the general public. It is therefore important to apply a methodology that attempts to demonstrate the appropriate bus or transit lane configuration for a particular road corridor that looks to optimise corridor efficiency.

The following six criteria are used to enable an appropriate assessment to guide decision-making in this regard. It is important to understand that calculations in this respect are not straight forward, due to at times complex variations in traffic patterns and composition that are induced with the implementation of bus or transit lanes.

Firstly, a shift in modal split generally that takes place, however the extent thereof varies depending on the characteristics of the affected traffic and the particular network. Secondly, there is commonly a shift in travel patterns, resulting in additional traffic being attracted and/or diverted to alternative routes in the immediate road network, depending on what best suits the commute. Localised traffic modelling can greatly assist in this process. Either way, some assumptions and sensitivity testing regarding the extent of modal shift and induced traffic related to an alternative bus or transit lane configuration, is necessary.

Notwithstanding the above, the following assessment criteria are applied, and the assessment process can be facilitated by applying the decision flow diagram that follows.

#### 5.1.2.3.1 Alignment with Strategic Transport Plan

Given the underlying objective to enable an effective PT system and transport system as a whole, there is a requirement to refer to strategic transport planning objectives and strategies for Auckland – making particular reference to the ITP, the RARP, Corridor Management Plan (where available), PT Network Planning documentation, and other strategic objectives.

This effectively implies that corridors identified as part of FTN and Connector network are likely to have bus lanes at some point. However, the timing thereof will be dependent on the efficiency of the corridor and current operational performance of PT.

#### 5.1.2.3.2 Characteristics of the Route

Each route should be considered in terms of appropriateness and the strategic direction for the route provided by the Corridor Management Plan (where available for the route). A key consideration in this respect is the current and planned number of buses on the route. Based on the RARP, where there are 15 or more buses per hour on a route, 'special treatment' for buses on this route should be considered.

In terms of the provision of bus lanes, it becomes increasingly justifiable as the number of buses on a corridor increases to 20 or more buses per hour during the peak, and most likely a necessity should there be 25 or more buses per hour.

Other aspects that would support bus lanes include:

- The route provides a strong connection between several key origins and destinations in terms of people movement;
- The route is through, or in close proximity to, significant passenger catchment areas, whether in reality or potential i.e. bus stops along the route are well used, or have the potential to do so based on accessibility; or
- The route goes through an area where there are no alternative means of public transport.

When the route in question has a freight emphasis in terms of the RARP, there will be a need to ensure freight takes appropriate preference over other modes of transport. A freight lane, T2 or T3 lane accommodating freight movement, can be considered, subject to the analytical assessment criteria below, however separation of priority by time of day may be a better outcome in some circumstances.

When a route is becoming congested, road widening may not always be practical not desirable. The only means of increasing efficiency/productivity would be through the use of a T2 or T3 lane, as appropriate, subject to the assessment below. Routes connecting schools also lend themselves to Bus or Transit lanes.

#### 5.1.2.3.3 Analytical Assessment 1: Travel time or Level of Service (LOS)

Travel time by mode, or travel speed, which is related to Level of service (LOS), is an important factor to consider. The Association of Australian and New Zealand Road Transport and Traffic Authorities (AUSTROADS), and the Highway Capacity Manual provide guidance on the level of service (LOS) for urban and suburban arterial roads with interrupted traffic flow conditions. These are described as follows:

**Table 4: Level of Service for Urban and Suburban Arterial Roads**

| Level of Service (LOS) | Characteristics of traffic movement |
|---|---|
| A | Generally free flow traffic conditions with operating speeds usually at 90% of the free flow speed (or sign-posted speed limit). Vehicles are unimpeded in manoeuvring in the traffic stream, with little travel delays. |
| B | Relatively unimpeded operation with average speeds of about 70% of the sign-posted speed limit. Manoeuvring in the traffic stream is only slightly restricted and travel delay is low. |
| C | Stable operating conditions but with manoeuvring becoming more restricted and motorists experience some driver discomfort and delays. Average travel speeds are at about 50% of the sign-posted speed limit. |
| D | Conditions border on becoming unstable with increased delay and lower travel speeds of about 40% of the sign-posted speed limit. Manoeuvring is becoming difficult. |
| E | Conditions are unstable and characterised by queuing and significant delays with average travel speeds reduced to about 33% of the sign-posted speed limited or lower. Manoeuvring is very restricted. Stop-go conditions are typical. |
| F | Conditions are characterised by excessive congestion and delays with average travel speeds of 25% of the sign-posted speed limit and below. |

Based on earlier work undertaken by Auckland Transport around the development of an overall network performance framework, it is desirable to enable a LOS of B or C for buses on PT network routes. This LOS depicts acceptable conditions with only moderate delays and therefore relatively favourable conditions during peak periods.

Consequently, where buses experience a poor LOS on an identified FTN or Connector route, bus lanes may be necessary to improve the LOS for PT movement on this route. Alternatively, should the LOS be acceptable, there may be no need to introduce bus lanes at this stage. In this regard, increased efficiency for the route through the implementation of a T2 or T3 transit lane, may be an option and may therefore be considered.

In terms of the overall network performance framework, general traffic and freight on arterial routes should ideally operate at LOS C or D (or better) during the peaks. This is based on resultant excessive delays and inefficiencies that would otherwise occur under more congested conditions associated with a LOS E and F. In such instances, there may be scope to increase corridor efficiency/productivity through the introduction of a transit lane, particularly in conjunction with a car-pooling strategy for the route.

#### 5.1.2.3.4 Analytical Assessment 2: Corridor Productivity or Efficiency

Corridor productivity of the route is defined as the movement of people through a corridor by lane per hour. Corridor productivity is calculated by multiplying the number of person trips with travel speed, expressed as an average by lane for the corridor. As such, the higher the number of person trips accommodated by lane per hour, or the higher the corridor productivity, then the more efficiently the route is operating. Austroads have suggested a benchmark value of 38,000 person-km /hour per lane be used to reflect favourable corridor productivity or efficiency of a corridor. In practise, a corridor productivity of 75% of this benchmark or higher, is desirable on arterials.

This Austroads value is derived from the productivity pertaining to a single lane carrying 900 vehicles/hour with an average travel speed of 35 km/h, which is representative of LOS B, and reflects a high level of productivity or efficiency for the route. Applying an average occupancy of 1.2 to 1.3 per vehicle, results in the 38,000 person-km/hour per lane value adopted in the assessment.

By way of comparison, 20 buses travelling at the same average speed, with occupancies of 55 passengers per bus, surpasses this productivity benchmark, and demonstrates the significant potential buses have in exponentially increasing productivity along a corridor. Another way of describing this is to note that the efficiency of a bus lane with 20 well-occupied buses will always be greater than the alternative of allowing that lane to be filled with traffic.

As an example, Dominion Road currently carries 34 buses in the morning peak hour. With the addition of a further 6 buses, the bus lane on Dominion Road will have the potential to operate at a productivity or efficiency, of double the 38,000 person-km/hour per lane benchmark. To achieve the same productivity without the bus lane, there would effectively need to be two additional general lanes added to the Dominion Road cross-section.

More importantly, the corridor productivity assessment of alternative bus or transit lane configurations provides a very useful and informative means of comparison. Furthermore, the potential capacity of various alternative lane configurations can also be assessed, which in particular can highlight the greatly increased efficiency of a corridor that have well patronised bus lanes.

Determining likely travel speeds of traffic streams under alternative lane configurations is an important variable to understand, as well as understanding the likely changes to traffic composition under the alternative lane configurations. By way of example, changing the bus lane on Tamaki Drive to a T2 lane, resulted in a 5 to 10% increase in T2 traffic, with a similar reduction in single occupancy vehicle traffic over the peak hour, and indicated an attraction of some additional T2 vehicles from adjacent routes of the network. Most noticeably however was that travel speed on the general lane reduced significantly by 8 to 10 km/h.

With respect to travel speeds, traffic modelling outputs or documented Speed-Flow curves can be used to assist in this process. Generally, travel speeds on a route vary based on specific conditions and characteristics of the route ranging from lane widths, road-side friction, road geometry, road environment, traffic signal density and traffic flow conditions of adjacent lanes. In general terms, travel speeds decrease with increased number of vehicles in the lane, increasingly so as volumes increase beyond 250 vehicles per lane.

As an example, Table 5 approximates this relationship for a relatively straight-forward section of road with isolated traffic signals, within a 50km/h speed limit environment. With additional traffic signals and within a more intensively built-up environment, the traffic flows for the respective LOS categories could well be half that listed.

**Table 5: LOS Relationship**

| Number of vehicles per hour per lane | Average speed | LOS |
|---|---|---|
| Less than 250 | > 41 km/h | A |
| 250 - 400 | 35 - 41 km/h | B |
| 400 – 550 | 28 - 35 km/h | C |
| 550 – 700 | 22 - 28 km/h | D |
| 700 – 800 | 17 - 22 km/h | E |

Comparison of the corridor productivity for the existing lane configuration against alternative proposed arrangements therefore highlights which arrangement is more efficient. Of particular significance for PT network routes, is the comparison of the efficiency of a bus lane to that which could be achieved by a T2 or T3 lane. If the bus lane performs well in terms of number of buses and patronage, implementation or continued operation of the bus lane will be comfortably justified.

On the other hand, if corridor productivity for a bus lane is lower than that for a T2 or T3 lane, this generally highlights under-performance of the bus lane or PT corridor, primarily associated with low bus frequencies, low patronage and poor operations in terms of travel times achieved on the route.

Under these circumstances, three options are recommended:

- look at ways of improving bus operations or patronage – so that it operates as an efficient PT emphasis route,
- review the PT network status of the route, and address the route as a general vehicle-emphasis route, or
- consider a T2 or T3 transit lane, provided the bus LOS is retained at B or C. This effectively achieves the primarily objective of PT emphasis or PT network routes, which is to provide relative ease of travel for PT on these routes, whilst affording additional benefit to higher-occupant vehicles on the corridor.

For general lane situations, the lane configuration resulting in the higher corridor productivity can be considered for implementation. This is particularly the case when comparisons of alternative bus or transit lane configurations exhibit a marked increase in corridor productivity, preferably a difference of 10% or more in relation to the benchmark, between the alternative configurations. A difference in corridor productivity of less than 5% is considered insufficient to justify a change from the current lane configuration, unless additional drivers support a change.

It is furthermore recommended that the assessment be carefully considered, and based on more representative survey information, to ensure that the outcomes of the assessment are sufficiently robust and representative of typical traffic conditions for the route. Where a change in bus or transit lane configuration is implied, it is recommended that additional surveys be undertaken to confirm the implied outcomes, given the sensitivity of the analyses to fluctuations in travel speeds, traffic compositions and occupancies. In doing so, a relatively consistent and constructive approach to operating the road network would be attained.

#### 5.1.2.3.5 Analytical Assessment 3: Person Trips

Person trips by lane would be a third analytical consideration, although aspects thereof are already accounted for in the corridor productivity analysis. As such, it is recommended this assessment be considered more as a means of confirming the foregoing assessment.

This measure can also be useful in providing an easily understood assessment for the implementation of alternative bus or transit lane configurations. Generally, where a transit lane accommodates approximately half of the total person trip movements on the corridor (assuming two lanes per direction), the equal share of person trips by lane suggests this is an appropriate split, irrespective of the proportion of vehicles on the respective lanes.

Whilst this may not always be achievable, a share in excess of 30% of the total person trips on the bus / transit lane, is considered favourable and will begin to exhibit increased corridor productivity and efficiency.

#### 5.1.2.3.6 Road Safety

Road safety continues to be a key consideration – albeit potentially generic, and potentially primarily related to lane widths and intersection treatments. Higher speeds and increased traffic volumes on a transit lane may be a concern, particularly with regards to cyclist safety, although research to date has not shown this to be a real concern.

With bus and transit lanes currently forming a significant element to the cycle network across the region, it is important to implement appropriate lane widths to these lanes going forward. AUSTROADS recommends an ideal lane width of 4.5m, with an absolute minimum of 4.2m. It is recommended that all future bus and transit lanes strictly adhere to these standards.

The safety of cyclists on bus or transit lanes at intersections, with particular regard to the conflict between the right turning vehicle and oncoming cyclist on the bus and transit lane, is a concern and requires further attention. This falls outside the scope of this project, however it is recommended that this safety aspect be researched in detailed, in order to arrive at an intersection treatment that more safely accommodates cycles.

#### 5.1.2.3.7 Decision Flow Diagram

The assessment criteria can be combined into the following decision flow diagram, to simplify and align decision making to balance current traffic operations with strategic aspirations, without unduly compromising either.

Initial direction is therefore provided by the strategic emphasis of the route, and is carried through the assessment analyses.

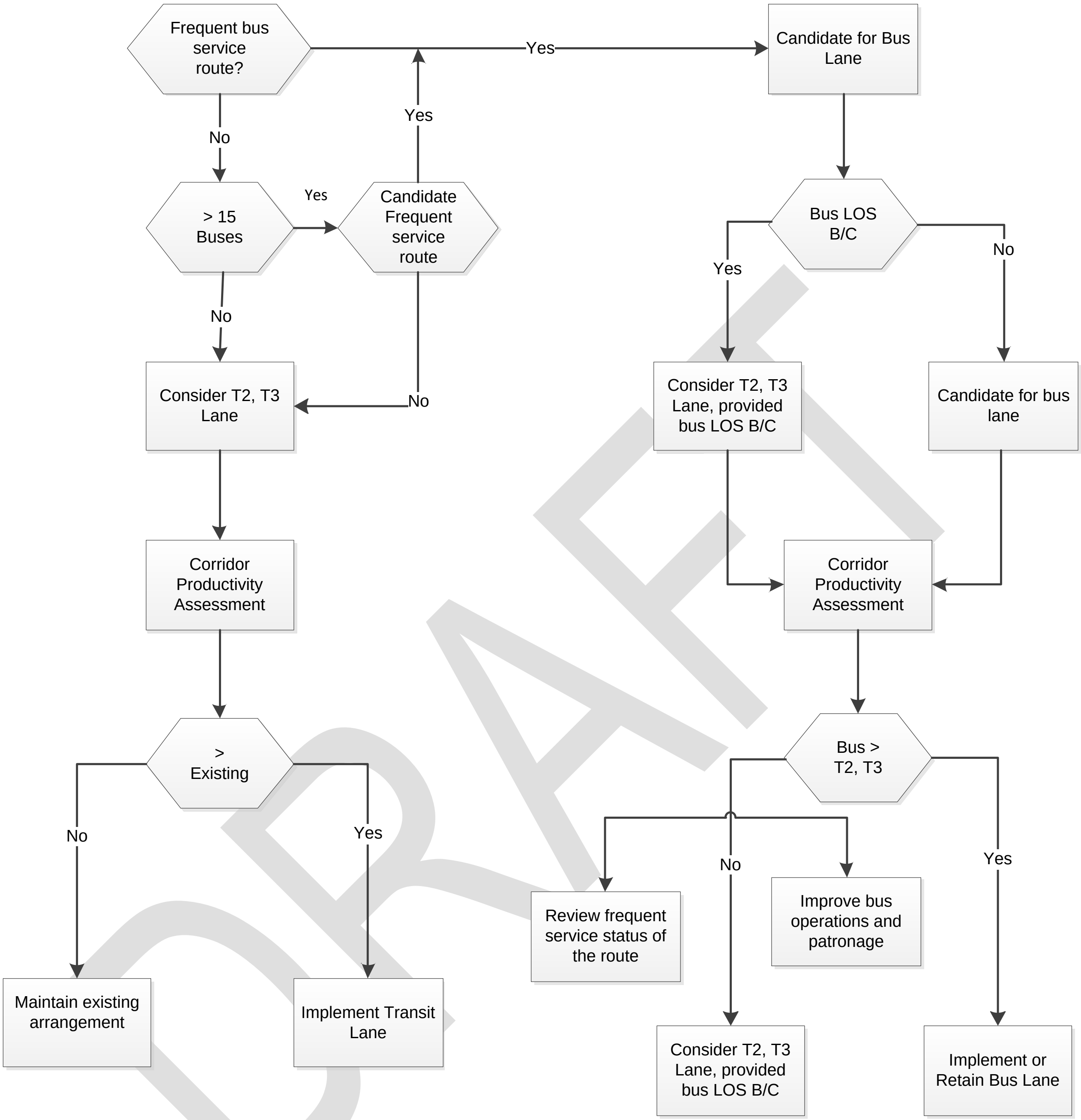



**Figure 12: Decision Flow Diagram**

### *5.1.2.4 General Considerations*

#### 5.1.2.4.1 Implementation Strategy of Bus and Transit Lanes

In general terms, progressive staging from a general lane, to a T2 lane, then a T3 lane, and finally to a bus lane configuration can take place with time, although subject to particular characteristics of the route. This progression would primarily be influenced from an operational perspective, based on the ability of respective lane configurations to deliver increased operational efficiencies on the road network.

As evidenced in the decision flow diagram, some alignment with strategic aspirations is retained, by looking to retain acceptable levels of service on PT emphasis or PT network routes. In principle, should buses be travelling with relative ease on a PT emphasis or PT network route, there is conceivably no need to implement a bus lane at this point.

Interesting to note is that the operational performance of buses generally remains similar to that under a T3 lane arrangement due to the typically low T3 traffic on the network. T3 arrangements will therefore largely tend to arise on routes that have not been identified at primarily PT emphasis or PT network routes.

#### 5.1.2.4.2 Appropriate Connections to Adjacent Network

The success of bus lanes and transit lanes can often be compromised by the end treatments, or where the lanes connect onto the road network downstream. It is recommended that special consideration be given to both the upstream and downstream connections to a bus or transit lane section, and ideally ensure that vehicles on bus and transit lanes are able to disperse or merge into the general traffic with little hindrance or friction, so as to retain network improvements associated with the bus or transit lane.

Accordingly, it is therefore recommended that:

- Merging two lanes into one downstream lane should be avoided
- Any merging that is otherwise required, should be undertaken over adequately long lengths to minimise traffic flow disruption
- Short sections of bus or transit lanes be considered in advance of the principal bus and transit lane to ensure operational continuity and safety.

#### 5.1.2.4.3 Use of Bus and Transit Lanes by Taxis

Taxis are permitted to travel on T2 or T3 lanes, whether or not there are an appropriate number of people on board, on the basis of the vehicle being a passenger service vehicle. This however does not apply to bus lanes.

Bus lanes are specifically reserved for buses, or small omnibuses, used for passenger services. Buses are required to have 10 or more seats to qualify, and in terms of enforceability, these vehicles are also required to be registered as a bus.

It is recommended to maintain this arrangement, due to the potential compromise in bus lane operation that can occur with the presence of taxis in bus lanes. This is particularly the case for the busy downtown areas.

Notwithstanding the above, accommodating taxis on some bus lanes, on a case by case analysis, can be a consideration, provided bus performance is expected to remain at acceptable levels. Implementation of such an arrangement on any given route should be treated as a trial, in order to ascertain the extent of induced taxi traffic and better understand the full impacts of the mixed traffic arrangement on the bus lanes. In these cases, a special bylaw would be required to be resolved, and appropriate signage included for this route.

An alternative means of implementing the latter, would be to convert the bus lane to a transit lane.

#### 5.1.2.4.4 Use of Bus and Transit Lanes by Mobility-Impaired Travellers

Mobility taxis are generally classified as a 10-seater or more, and therefore if registered as a bus, would be permitted on bus lanes.

Qualifying operators should be required to clearly display mobility-related disks on both the front and rear of the vehicle, so as to facilitate enforcement of bus lanes. It is recommended that these disks be formally supplied by Auckland Transport.

#### 5.1.2.4.5 Treatment of bus lanes through town centres

Bus lanes should generally be retained through town centres, however where there are a series of intersections resulting in a complexity of vehicular movements across the bus or transit lanes, clearways would tend to be more appropriate.

It is however important to ensure movement through these areas for bus or transit vehicle either through retaining the lane configuration or providing clearways. This may not always be practical and will need to be tempered in consideration to other road users and demands by time of day.

#### 5.1.2.4.6 Bus and Transit Lane Operating Times

Uniform operating times would be greatly beneficial to the driving public due to the consistency provided; however this is not possible given the differing traffic characteristic for different parts of the road network.

Consequently, in busy downtown sections, a two hour operating period generally is inadequate to accommodate peak demands, whereas this may be appropriate towards suburbia. Whilst the operating time periods may be shorter for the latter, the added complexity is that these periods are largely applicable at different times depending on the relative length of the route, or distance from activity centres.

It is nonetheless recommended that variations be limited, and kept consistent along individual routes, and within local areas if possible. The following time periods are to be typically used, unless inappropriate.

**Table 6: Peak Time Periods**

| AM Peak | PM Peak |
|---|---|
| 7 – 9am | 4 – 6pm |
| 6:30 – 9am | 4 – 7pm |
| 6 – 10am* | 3 – 7pm* |

- Typical within the city centre

5.1.2.4.7 Education and Communication Plans

Typically as with most engineering applications, engineering outcomes are enhanced when objectives are transparent and understood by users. It is therefore important to incorporate an extensive communication plan with the implementation of any new bus or transit lane, as well as provide ongoing communication on the topic.

Preceding any bus or transit lane implementation, it is therefore recommended that extensive communication be undertaken through a range of education, promotion and social marketing media, and would include the local board, local newspapers and the AT website.

In terms of education of the general public is concerned, it is recommended that there be sporadic and sustained media campaigns aimed at explaining and reinforcing bus and transit lanes operations to the general public. This would include periodic campaigns to key catchment areas and availability of information, and would include technical information, frequently asked questions and the generation of up to date transit lane map for customers. Where possible this would be linked to programmes such as car-pooling, personal journey planning, travel planning and public transport promotion.

5.1.2.4.8 Implementation or design Standards – HOW?

An important aspect of bus or transit lanes is that whilst overall network efficiencies can be gained through the implementation thereof, these can only be fully realised when appropriately understood, recognised and adhered to by motorists and general users.

As a result, there is a requirement to provide a guide to standard templates for bus and transit lanes, generic to all types of locations, to be applied by Auckland Transport in project designs involving bus and transit lanes.

An important change in the Traffic Control Devices (TCD) Rule by NZTA in April 2011, enabled the designation of bus (and transit) lanes from the beginning of a corridor to the end, without the need to break up the routes into multiple segments at intersections along the way, to enable the movement of vehicles across bus lanes within 50 metres of the junction. The change has resulted in the reduction of signage necessary along the route, and in turn facilitates clarity to road users. By highlighting where 50 metres from an approaching junction is, further provides clarity to road users.

As a result, a series of templates have been developed to cover the signage and markings of bus lanes and transit lanes, providing standardised treatments for the region. The templates cover the start of the bus lane, treatment at intersections with a 50m marking, signalised intersection treatments, and ending the bus lane. These are shown below and can be summarised to comprise:

1. The use of a solid green line adjacent to the solid white line demarcating the bus or transit lane.
2. The introduction of a broken green and white line to highlight a distance of 50m from an approaching junction to reflect where drivers may cross into the bus or transit lane in order to execute a turning manoeuvre. Note that the use of the bus lane by general traffic in this situation is solely for the purposes of executing the left turn movement. It remains illegal for a motorist to enter the bus lane within this 50m area, and continue straight through the intersection.
3. The use of a symbol-orientated sign to replace the otherwise wordy signage required to enable buses or transit vehicles (and users of these lanes to proceed straight ahead on left turn lanes.
4. An extension to the use of the solid green and white line markings is the use of low-profile LED raised pavement markers (RPMs) along the line. These can be introduced for all bus or transit lanes, or for specific routes where increased clarity is sought. An added advantage of this application is that the LEDs can be illuminated to coincide with the operation times of the bus or transit lane, thereby maximising clarity of bus lane operation and operating times. The RPMs are to be low-profile so as not to introduce a safety concern for cyclists.
5. A further extension to the above is the use of electronic signage or Variable Message Signage (VMS) to compliment standard signage, and illuminated during appropriate operating times.

Statutory requirements for Special Vehicle Lanes (SVLs) are set out in the Land Transport Rule: Traffic Control Devices 2004 (TCD Rule) and is required to be adhered to. Traffic signs and road markings are to comply with the TCD Rule, Traffic Control Devices Manual, and Manual of Traffic Signs and Markings (MOTSAM). These design standards provide further guidance for signs and road markings to be used in the design and implementation of SVLs: BUS ONLY, BUS LANE, T2 and T3 transit lanes.

Sign faces shown in these design standards are indicative only and these are not to be used as design templates.  AT is in the process of rationalising bus and transit lane signage.

The design standards are mandatory on AT controlled roads and dispensation away from these standards requires approval from AT.

The standards have been trialled on a number of special vehicle lanes sites within Auckland. The status of the design standards is DRAFT, with a review of the trial sites scheduled to be completed in early 2014 and any necessary amendments to the design standards undertaken.

The following are specific details pertaining to Figures 13 to 27. Dimensions on the figures are in metres unless stated otherwise.

1. Special vehicle lane white symbol will be the standard as detailed in TCD Rule Schedule 2.
2. Special vehicle lane sign to comply with TCD Rule Schedule 1.
3. A consistent combination of the white symbol, sign, and coloured surfacing is to be used as defined within these standards.
4. A green panel is to be provided at each special vehicle lane symbol and is to consist of green resin surfacing.
5. Urban green panel for a bus lane symbol or bus only symbol to be 10 metres in height and the symbol is to be centred in the panel, with 2 metres clearance to the top and bottom of the panel (see Figure 13).
6. Urban green panel for a transit lane symbol (T2 or T3) to be 6.4 metres in height and the symbol is to be centred in the panel, with 2 metres clearance to the top and bottom of the panel (see Figure 14).
7. A red shield is to be provided at each transit lane symbol and is to consist of red resin surfacing (see Figure 14). Urban red shield to be 3.2 metres in height and 2.6 metres wide (see Figure 14).
8. Special vehicle lane sign to be aligned with the bottom of the SVL white symbol at the beginning of the SVL. The start of a special vehicle lane is defined as the position of the SVL begins sign (see Figures 15 and 16).
9. Special vehicle lane sign to be aligned with the bottom of the SVL white symbol at all intermediate locations, including at the symbol 50 metres prior to intersection, and at the symbol directly after an intersection. Exceptions to this will be accepted where physical restrictions of trees, poles, underground services, sight-distance etc are an issue, but they must be located within the limits of the top and bottom of the SVL white symbol.
10. Special vehicle lane sign to be aligned with the top of the SVL white symbol at the end of the SVL. The end of a special vehicle lane is defined as the position of the SVL ends sign (see Figures 17 and 18).
11. White continuous road marking is to define extents of bus and transit lanes, the width being 100mm wide or 150mm wide where increased conspicuousness is sought.
12. Green continuous line is to connect urban bus and transit lane panels and is to be 150mm wide green resin surfacing, laid adjacent the white continuous road marking. Reduction to a 100mm width is not permissible.
13. Special vehicle lane symbols/signs are to be spaced no more than 100 metres apart (see Figures 15 and 16).
14. Flush LED white colour pavement markers may be used to further highlight the presence of an operational SVL where increased clarity is sought. The LEDs are to be placed on the white line and spaced at 10 metres apart.
15. Mid-block special vehicle lane information signs, detailing permissible users, are optional and their merit needs to be assessed on a route by route basis. The mid-block information signs are used raise awareness of those who can use the lanes, such as cyclists; however they may be considered unnecessary.

16. The start of the special vehicle lane is to be proceeded by a taper at least 10 metres in length and SVL ahead signage (see Figures 15 and 16).
17. When a special vehicle lane passes through an intersection, a taper at least 6 metres in length is to be provided for the outbound movement (see Figures 19 and 20).
18. The 50 metre markings prior to an intersection reflects where drivers may cross into the special vehicle lane in order to execute a left turning manoeuvre. Note that the use of the special vehicle lane by general traffic in this situation is solely for the purposes of executing the left turn movement. It remains illegal for a motorist to enter the bus lane within this 50 metre area, and continue straight through the intersection.
19. The 50 metre markings must be 50 metres from the kerb-line intersection point (IP), unless the geometry of an intersection is such that the kerb-line intersection point lies beyond likely left turn vehicular tracking. In such cases, the intersection point between the kerb-line extension and centre of left turn lane (LTIP) is to be used (see Figures 19 and 20).
20. The 50 metre point prior to an intersection where drivers may cross into the special vehicle lane in order to execute a left turning manoeuvre is defined as the top of the green panel and start of the white and green continuity lane lines (see Figures 19 and 20).
21. The white and green continuity lane lines are to consist of 1 metre stripes and 2 metre gaps with widths matching the continuous white and green lane lines (see Figures 19 and 20).
22. Special vehicle lane users can proceed straight ahead in a left turn only lane where approved signage allowing this movement has been provided (see Figure 22).
23. On approaches to signalised intersections the continuous 15 metre white/green lane lines in advance of the limit line are to override the continuity white/green lane lines (see Figures 21 and 22).
24. On approaches to an intersection where a mid-block pedestrian crossing lies within the 50 metre markings, the continuous 15 metre white/green lane lines in advance of the limit line are to override the intermittent white/green lane lines. As the opportunity for vehicles to move into the SVL to undertake a left turning manoeuvre are reduced, the 50 metre marking should be extended to provide at least 40 metres of effective lane change opportunity (see Figure 24).
25. Where intersections are closely spaced, see Figures 25 and 26 for standard special vehicle lane layouts.
26. When the end of a special vehicle lane terminates within 50 metres on an intersection, the standard end treatment is to be used combined with continuity lane lines (see Figure 27).

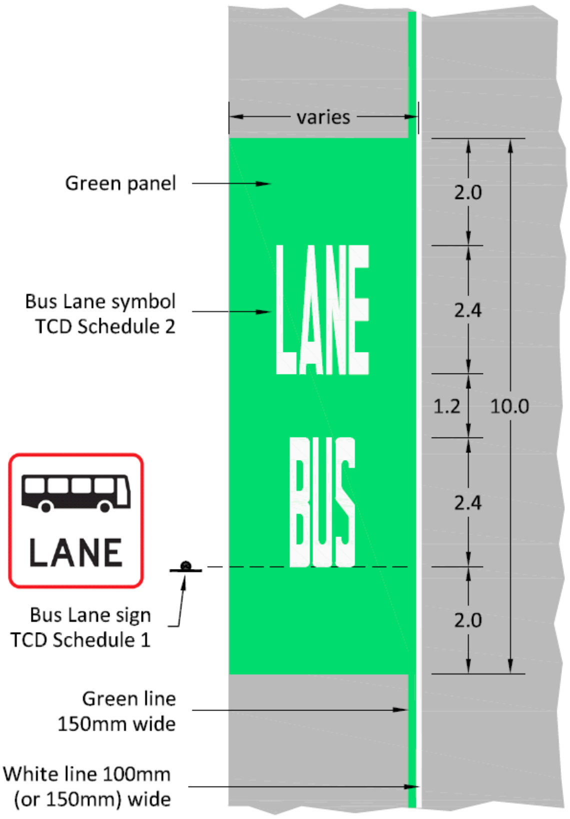



**Figure 13: Bus Lane Identification**

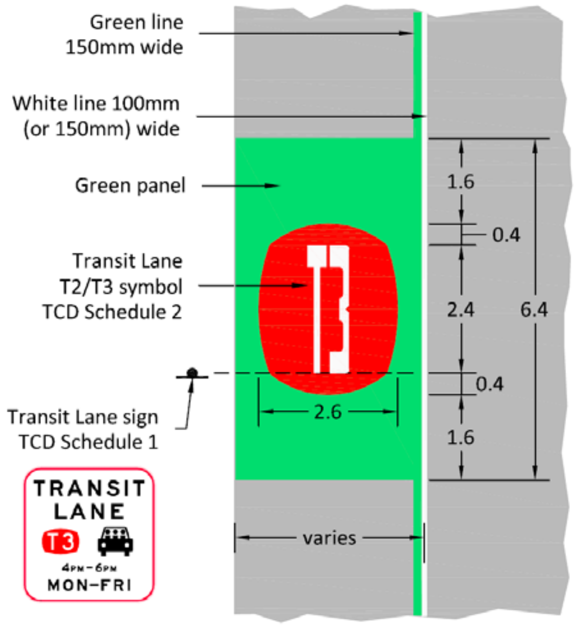
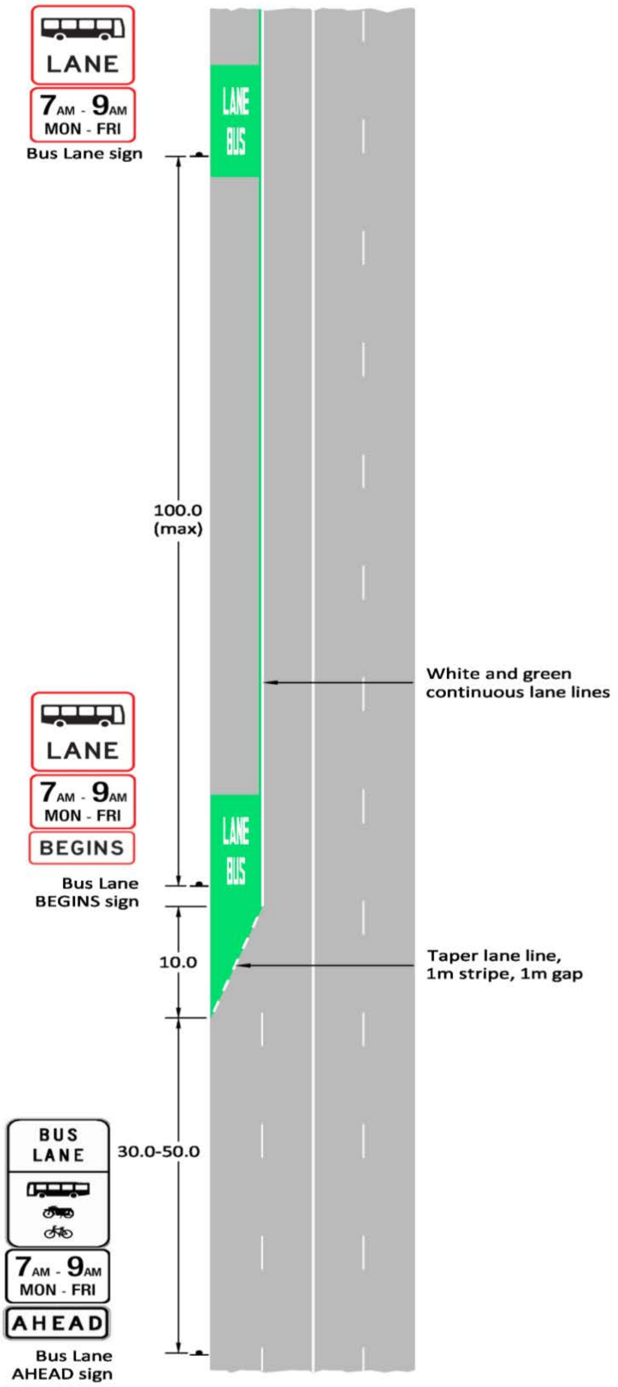



**Figure 14: Transit Lane Identification**



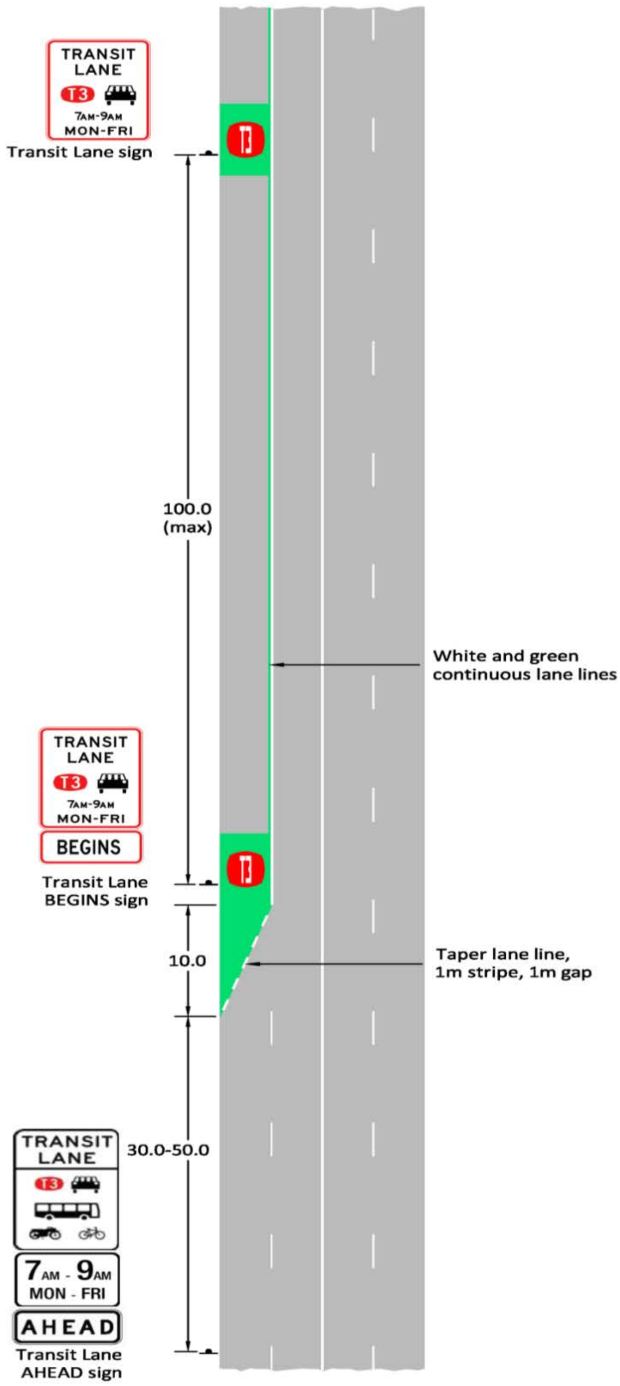




**Figure 15: Bus Lane Advance, Start and Repeatability**

**Figure 16: Transit Lane Advance, Start and Repeatability**

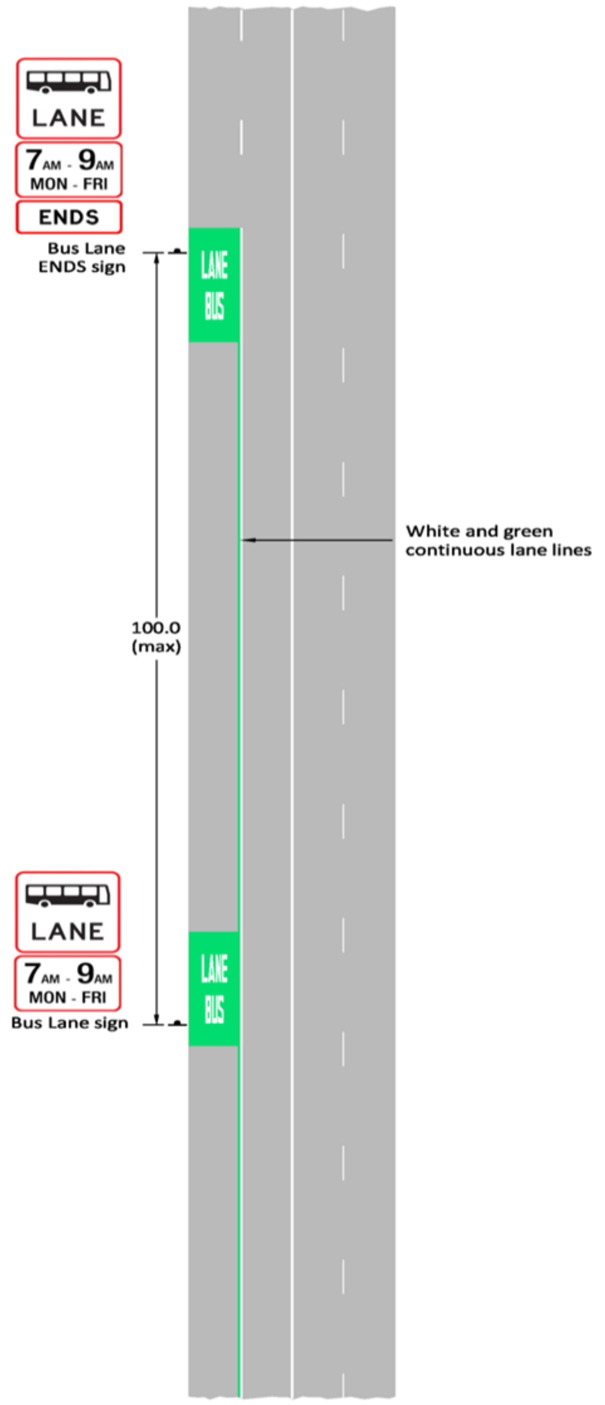



Figure 17: Bus Lane End and Repeatability

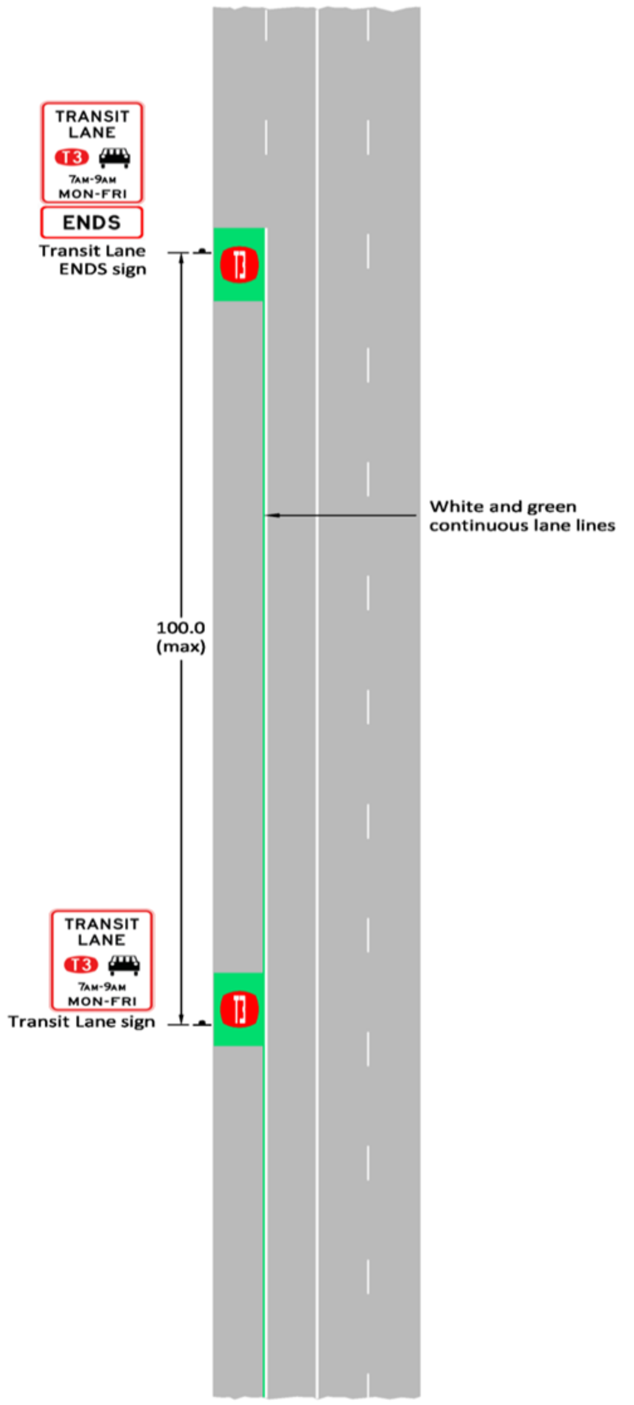



Figure 18: Transit Lane End and Repeatability

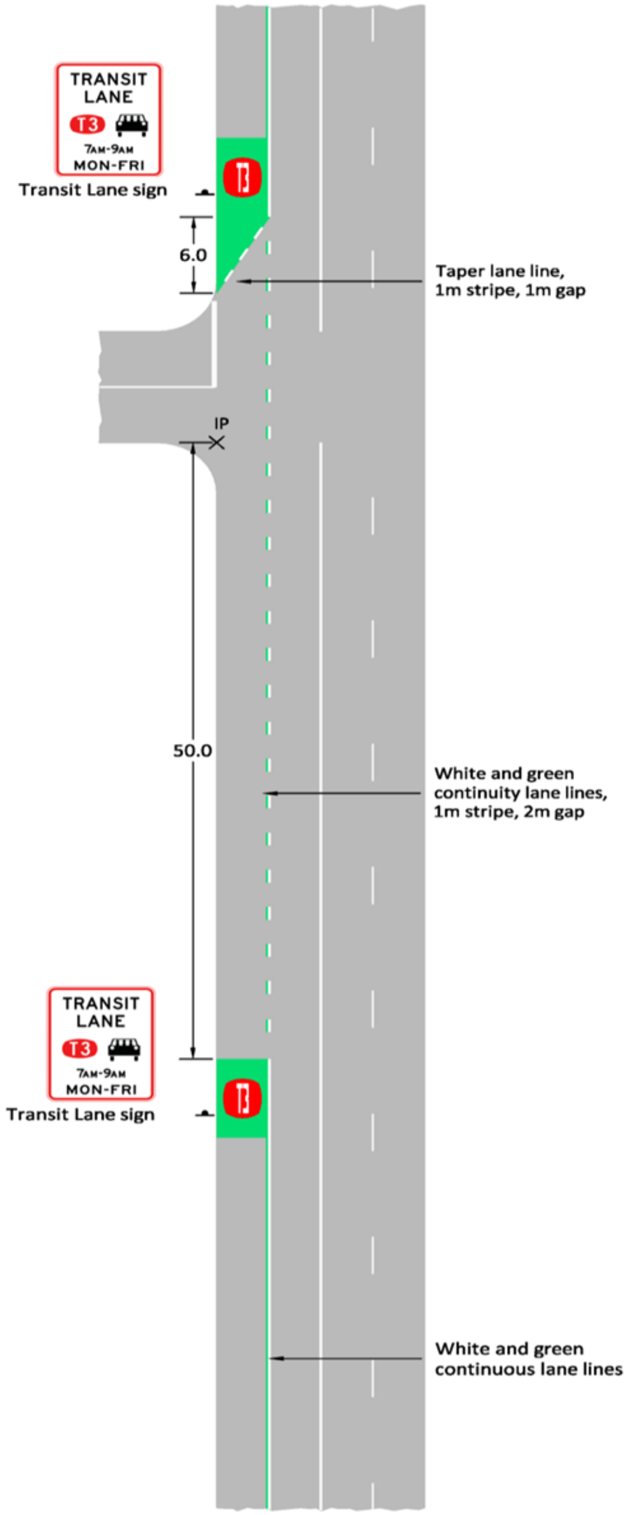



**Figure 19: Minor Intersection approach**

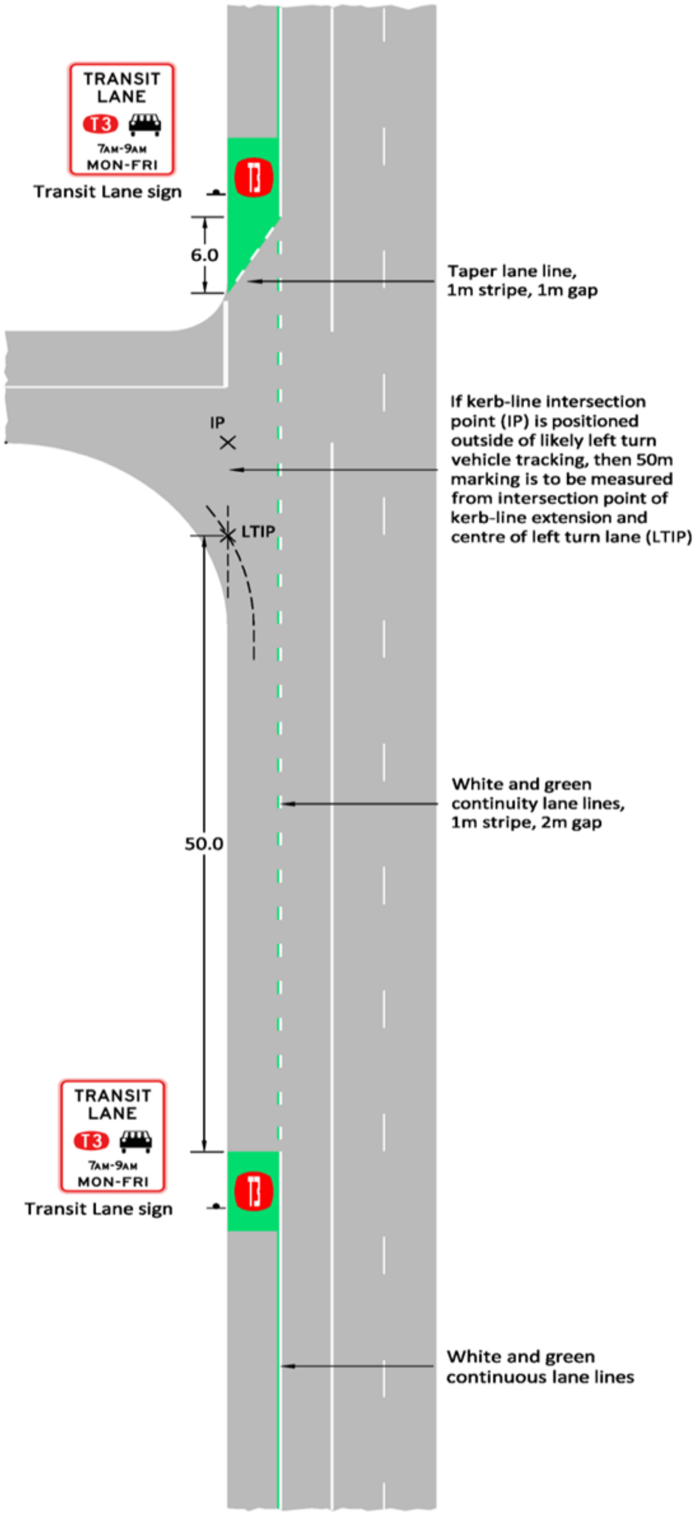



**Figure 20: Major Intersection approach**

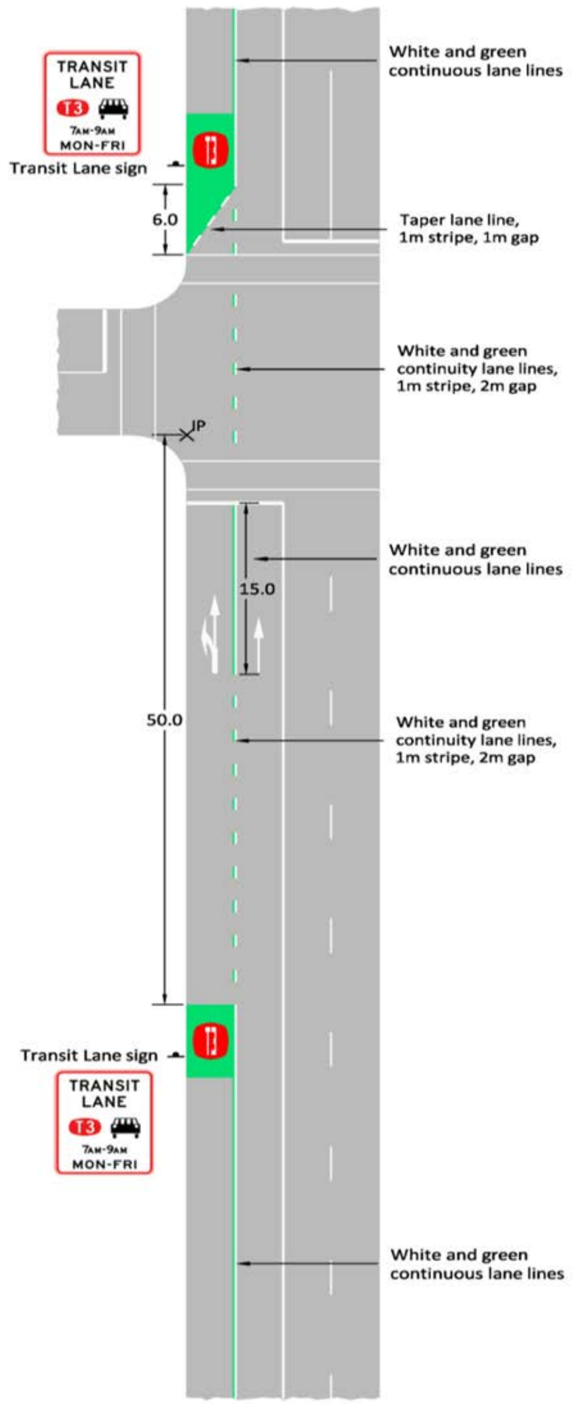



Figure 21: Signalised intersection with shared left/through lane

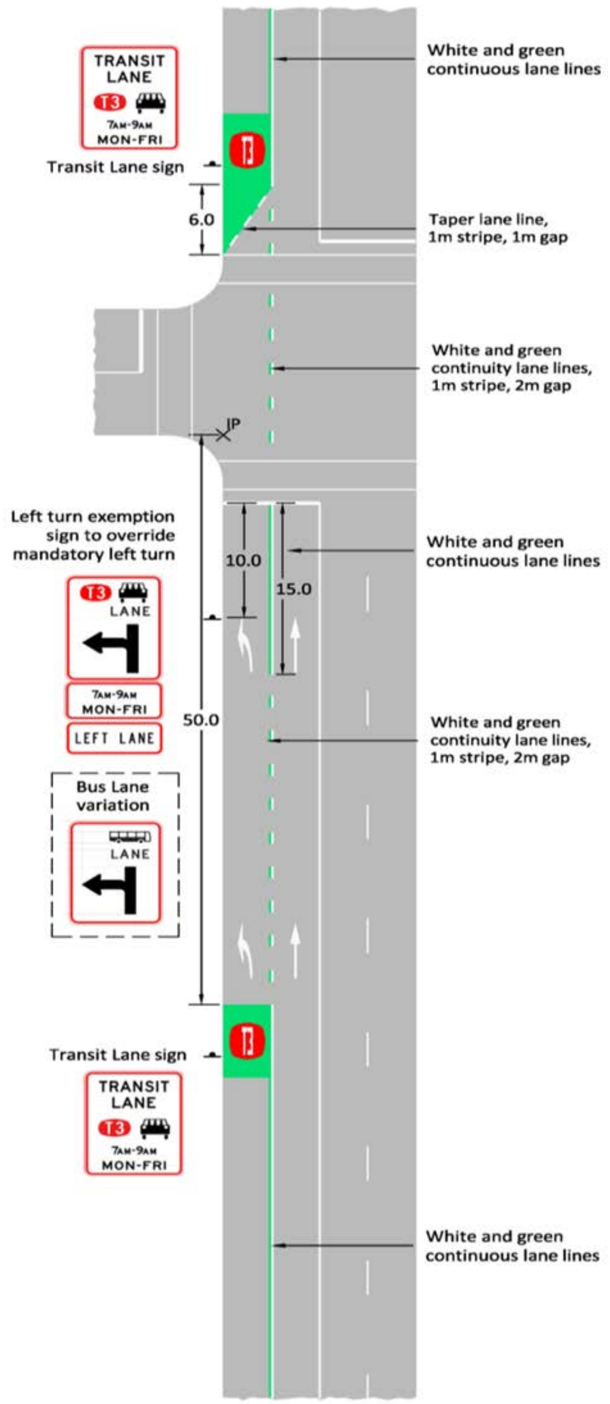



Figure 22: Signalised intersection with mandatory left turn lane and SVL user exemption

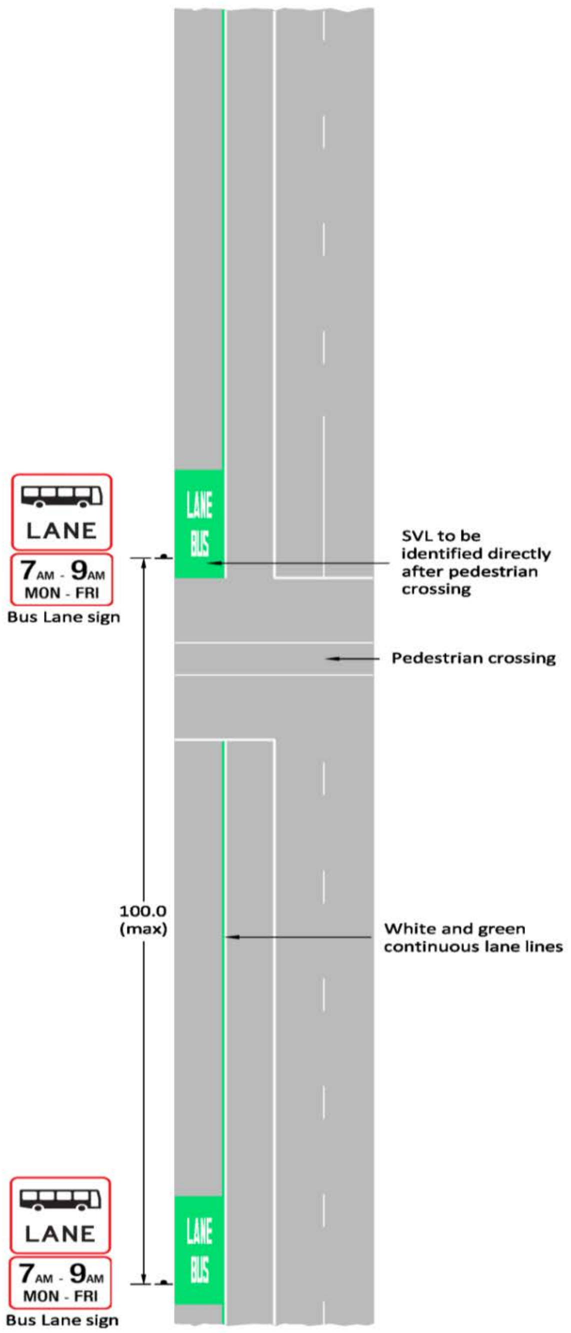



Figure 23: Mid Block Pedestrian Crossing

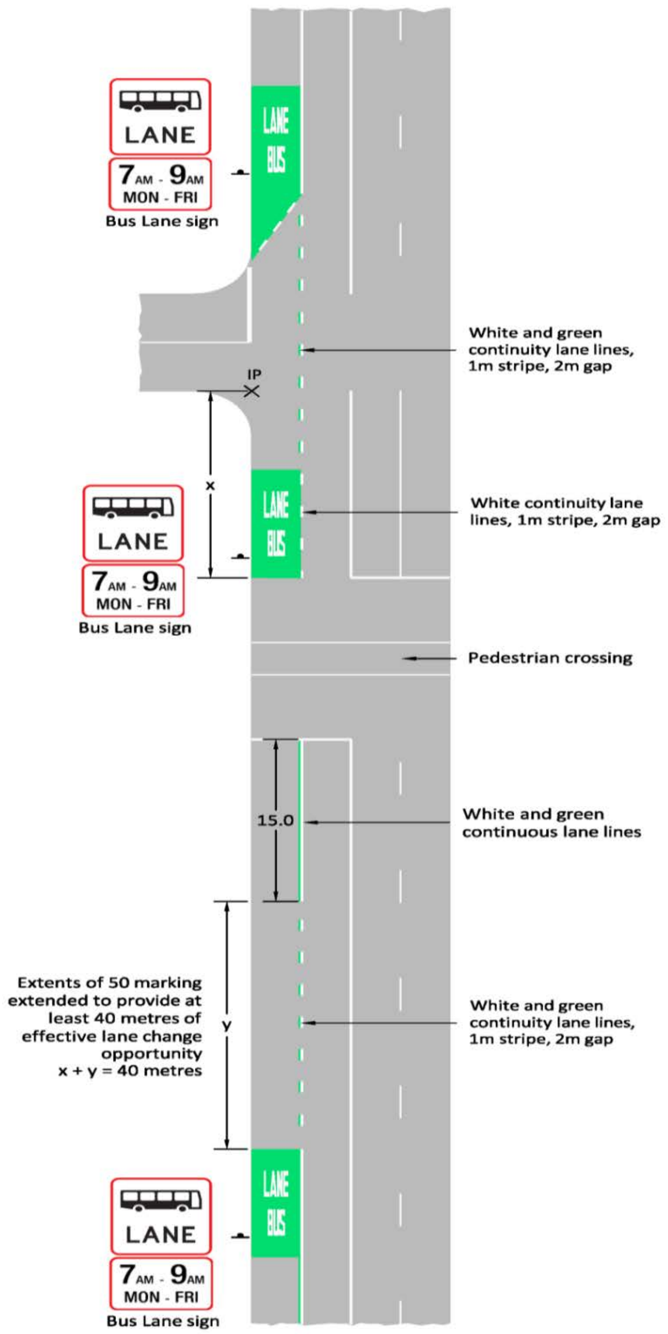



Figure 24: Mid Block Pedestrian Crossing Combined with Intersection Approach

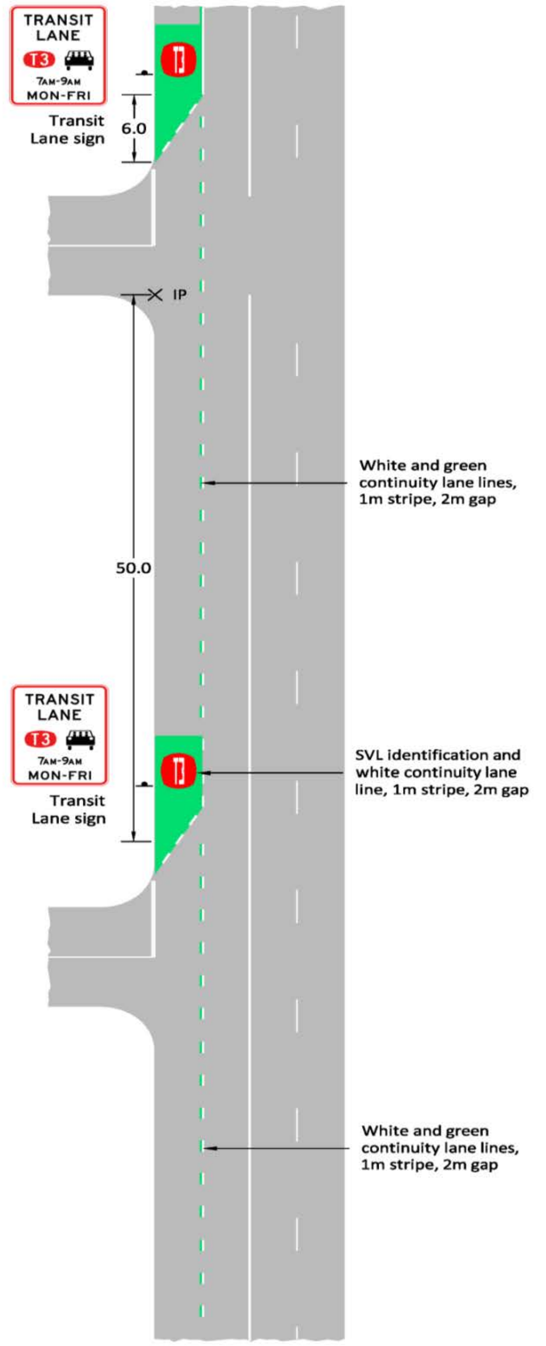



Figure 25: Intersections Spaced at Less than 60 metres

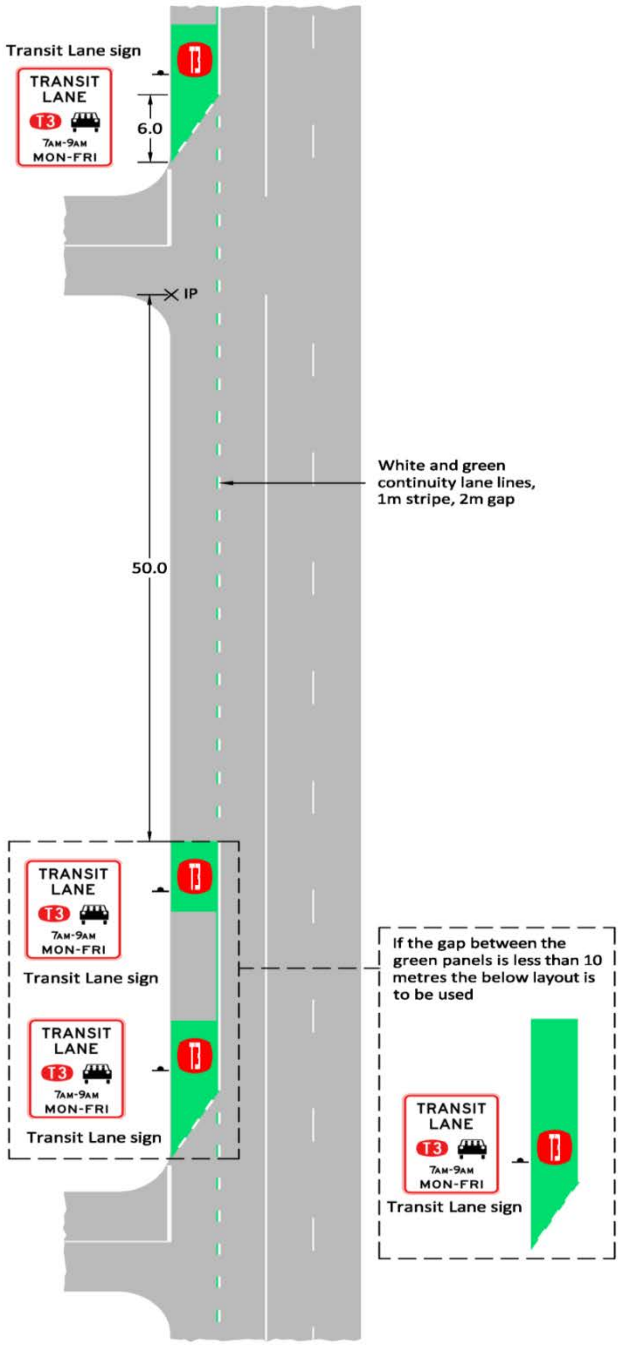



Figure 26: Intersections Spaced Between 60 and 80 metres

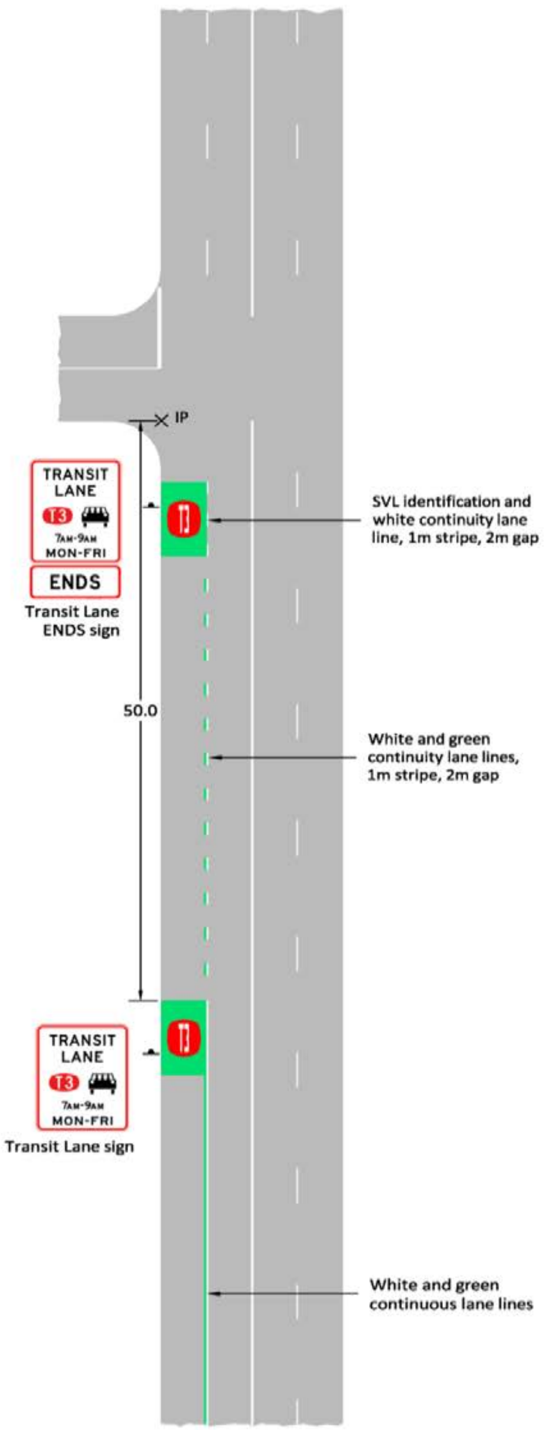



**Figure 27: Intersection Approach Combined with END of SVL**

## 5.1.3 Appendices

## Appendix 5A - Bus and Transit Lane Inventory

**Central and South** Intersections Spaced Between 60 to 80 Metres

**Table 7: Bus and Transit Lane Inventory Central and South**

| Road | Direction | From | To |
|---|---|---|---|
| Great North Road | Citybound | Pt Chev/GNR | Ponsonby/GNR |
| Great North Road | Outbound | Ponsonby/GNR | Pt Chev/GNR |
| Fanshawe Street | Eastbound | Beaumont/Fanshawe | Nelson/Fanshawe |
| Fanshawe Street | Westbound | Nelson/Fanshawe | Beaumont/Fanshawe |
| Albert Street | Northbound | Wellesley/Albert | Quay/Albert |
| Albert Street | Southbound | Quay/Albert | Wellesley/Albert |
| Symonds Street | Southbound | Waterloo Quadrant/Symonds | Newton/Symonds |
| New North Road | Citybound | Sandringham/New North | New North/Dominion |
| New North Road | Outbound | New North/Dominion | Sandringham/New North |
| Sandringham Road | Citybound | Eden View Road/Sandringham | Haverstock Rd/Sandringham |
| Sandringham Road | Citybound | Kitchener/Sandringham | Sandringham/New North |
| Sandringham Road | Outbound | Sandringham/New North | Burnley Tce/Sandringham |
| Sandringham Road | Outbound | Sandringham/Balmoral | Sandringham/Tranmere |
| Sandringham Road | Outbound | Haverstock Rd/Sandringham | Eden View Road/Sandringham |
| Dominion Road | Inbound | Howell Cres/Dominion | Youth St/Dominion |
| Dominion Road | Inbound | Denbigh Ave/Dominion | Onslow Rd/Dominion |
| Dominion Road | Outbound | View Rd/Dominion | Valley Rd/Dominion |
| Dominion Road | Outbound | Bellwood Ave/Dominion | Balmoral/Dominion |
| Dominion Road | Outbound | Kensington/Dominion | Dominion/Mt Albert |
| Mt Eden Road | Inbound | Shackleton/Mt Eden | Balmoral/Mt Eden |
| Mt Eden Road | Inbound | Balmoral/Mt Eden | Grange/Mt Eden |
| Mt Eden Road | Outbound | Percy/Mt Eden | Stokes/Mt Eden |
| Mt Eden Road | Outbound | Disraeli/Mt Eden | Pencarrow/Mt Eden |
| Khyber Pass Road | Eastbound | Khyber Pass/Boston | Broadway/Khyber Pass |
| Khyber Pass Road | Westbound | Broadway/Khyber Pass | Khyber Pass/Boston |
| Broadway | Inbound | Below SH1 | Morrow/Broadway |
| Broadway | Outbound | Below SH1 | Morrow/Broadway |
| Great South Road | Inbound | GSR/E-P Hwy | GSR/Manukau |
| Great South Road | Inbound | Shirley/GSR | GSR/Bairds |
| Great South Road | Outbound | GSR/Bairds | Shirley/GSR |
| Great South Road | Inbound | Hill Road/GSR | GSR/Orams Rd |

| Road | Direction | From | To |
|---|---|---|---|
| Remuera Road | Inbound | Market/Remuera | Remuera/Broadway |
| Remuera Road | Inbound | Blackett/St Johns | Upland/Remuera |
| Remuera Road | Outbound | St Marks/Remuera | Market/Remuera |
| Remuera Road | Outbound | Upland/Remuera | Blackett/St Johns |
| Donovan & Kinross Street | Eastbound | 32 Donovan Street | Boundary/Donovan |
| Bader Drive | Westbound | Ashgrove/Bader | Mascot Ave/Bader |
| Main Highway | Westbound | Walpole/Main Highway | Main Highway/Great South Road |
| Karangahape Road | Eastbound | Days/K Road | Pitt/Road |
| Ponsonby | Citybound | Hopetoun | Karangahape/Ponsonby |
| Quay Street | Westbound | The Strand/Quay | Commerce/Quay |
| Anzac Avenue | Citybound | Waterloo Quadrant/Alten Ave | Beach Rd/Anzac |
| Anzac Avenue | Outtbound | Beach Rd/Anzac | Waterloo Quadrant/Alten Ave |
| Grafton Bridge | Both directions | | |
| T2 Transit Lane (AM Peak) | | | |
| Tamaki Drive (T2now) | Citybound | Before Kelly Tarltons | Ngapipi/Tamaki |

**Table 8: Bus and Transit Lane Inventory North**

| Road | Direction | From | To |
|---|---|---|---|
| Northern Busway | | | |
| Busway (parallel to SH1) | Southbound | Esmonde Road | Onewa Road Interchange |
| Busway (parallel to SH1) | Both direction | Constellation Drive | Esmonde Road |
| Bus Lane | | | |
| Road | Direction | From | To |
| Esmonde Road | Westbound | Eldon Avenue | Connects to southbound busway |
| Fred Thomas Drive | Southbound | Anzac Street | Des Swann Drive |
| Civic Crescent | Eastbound | Both direction | |
| T2 Transit Lane (AM Peak) | | | |
| Road | Direction | From | To |
| Akoranga Drive | Eastbound | Northcote Road | Warehouse Way |
| Constellation Drive | Westbound | East Coast Road | Parkway Drive |
| East Coast Road | Southbound | Opposite William Souter Street | Eastcoast Road/Forrest Hill Roundabout |
| Forrest Hill Road | Southbound | East Coast Road | Curry Crescent |
| Shakespeare Road | Westbound | East Coast Road | Hospital Road |
| T2 Transit Lane (PM Peak) | | | |
| Road | Direction | From | To |

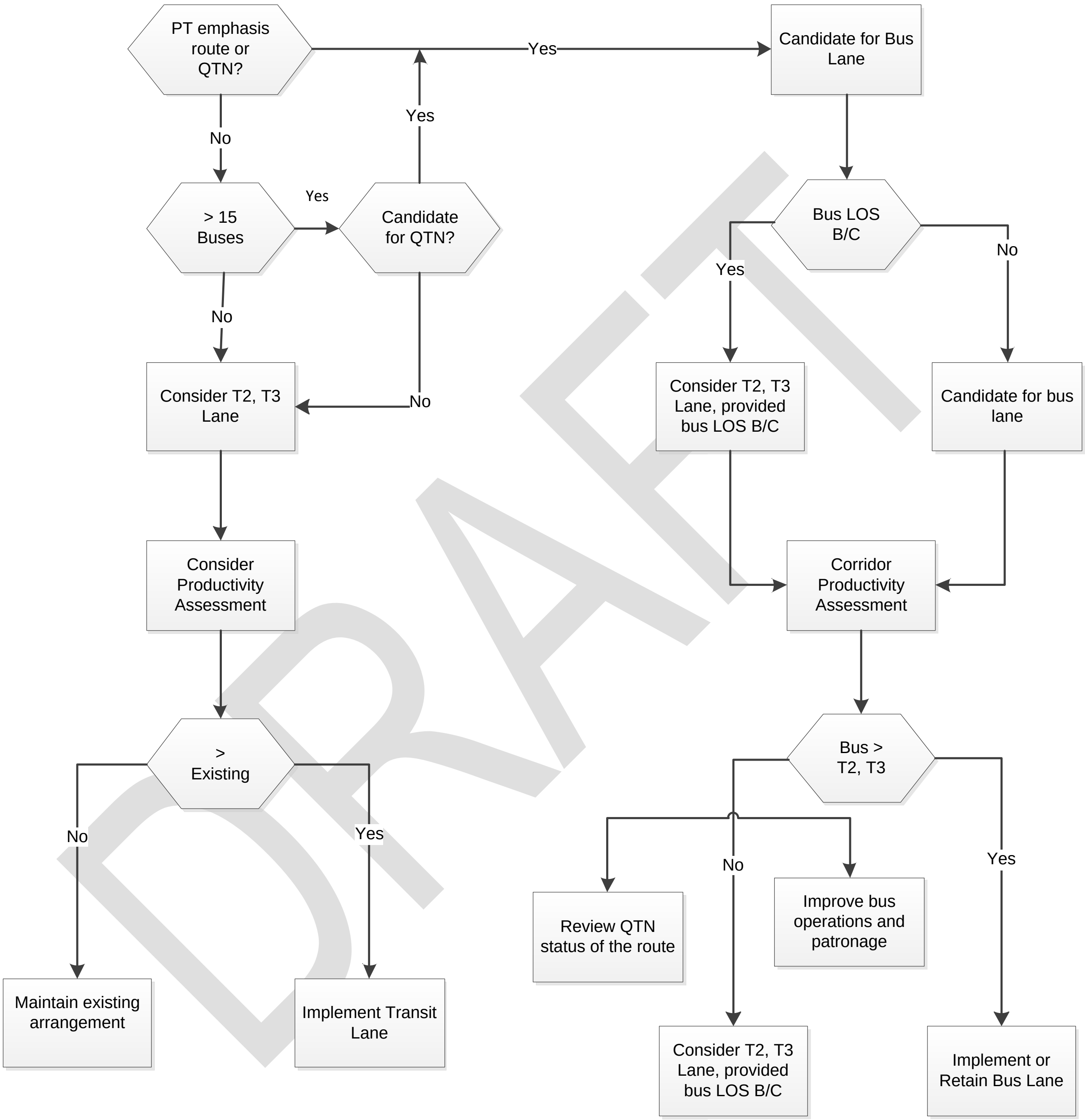
| Road | Direction | From | To |
|---|---|---|---|
| Constellation Drive | Eastbound | Parkway Drive | Centorian Way |
| Akoranga Drive | Westbound | The Warehouse Way | Northcote Road |
| T3 Transit Lane (AM Peak) | | | |
| Road | Direction | From | To |
| Lake Road (Northcote) | Southbound | 41 Lake Road | Onewa Road |
| Onewa Road | Eastbound | Birkenhead Avenue | 13 Onewa Road |
| Northern Motorway (SH1) | | | |
| Road | Direction | Position | |
| SH1 (Onewa Road) | North | Afternoon peak shoulder buslane from Onewa to Esmonde Road | |
| McClymonts Bridge | South | Bus Lane for buses heading onto the motorway | |
| SH1 (Greville Road) | South | Morning peak shoulder buslane from Greville Road to Constellation Drive | |

**Table 9: Bus and Transit Lane Inventory West**

| Road | Direction | From | To |
|---|---|---|---|
| Lincoln Road | Northbound | approach to Triangle | |
| Great North Road | Westbound | approach to Edsel | |
| Great North Road | Westbound | approach to West Coast Road | |
| Totara Avenue | Both directions | Rankin Ave to Memorial Drive | |
| Westgate Main Street | Approach to SH16 | | |
| SH16 bus lane | Waterview to Lincoln Rd | | |

# Appendix 5B - Assessment Criteria - Example of application

## Dominion Road Bus Lane Case Study



## AM Peak

| Mode | Travel Speed | LOS |
|---|---|---|
| Bus | 17 | E |
| General Traffic | 13 | F |
| T2 Traffic | 13 | F |
| T3 Traffic | 13 | F |
| Freight | 13 | F |

| Existing Model Split by Mode | | | | |
|---|---|---|---|---|
| Mode | Volume | % | Person-trips | % |
| Bus | 34 | 4% | 1261 | 53% |
| T1 Vehicle | 657 | 73% | 657 | 28% |
| T2 Vehicle | 164 | 18% | 329 | 14% |
| T3 Vehicle | 43 | 5% | 130 | 5% |

| Existing Bus Lane Scenario | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Mode | Volume | % | Person-trips | % | Speed | LOS | Productivity | % Benchmark |
| Bus Lane | 34 | 4% | 1261 | 53% | 17 | E | 21437 | 56% |
| General Lane | 865 | 96% | 1116 | 47% | 13 | F | 14519 | 38% |
| Both Lane | 899 | 100% | 2377 | 100% | | | 17973 | 47% |

| T2 Lane Scenario | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Mode | Volume | % | Person-trips | % | Speed | LOS | Productivity | % Benchmark |
| T2 Lane | 241 | 27% | 1719 | 72% | 14 | E | 24056 | 63% |
| General Lane | 657 | 73% | 657 | 28% | 15 | E | 9855 | 26% |
| Both Lane | 899 | 100% | 2377 | 100% | | | 16967 | 45% |

| T3 Lane Scenario | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Mode | Volume | % | Person-trips | % | Speed | LOS | Productivity | % Benchmark |
| T3 Lane | 77 | 9% | 1391 | 59% | 17 | E | 23647 | 62% |
| General Lane | 822 | 91% | 986 | 41% | 13 | F | 12819 | 34% |
| Both Lane | 899 | 100% | 2377 | 100% | | | 18233 | 48% |

## PM Peak

| Mode | Travel Speed | LOS |
|---|---|---|
| Bus | 20 | D |
| General Traffic | 19 | D |
| T2 Traffic | 19 | D |
| T3 Traffic | 19 | D |
| Freight | 19 | D |

| Existing Model Split by Mode | | | | |
|---|---|---|---|---|
| Mode | Volume | % | Person-trips | % |
| Bus | 25 | 2% | 722 | 33% |
| T1 Vehicle | 857 | 74% | 857 | 39% |
| T2 Vehicle | 214 | 19% | 429 | 20% |
| T3 Vehicle | 56 | 5% | 169 | 8% |

| Existing Bus Lane Scenario | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Mode | Volume | % | Person-trips | % | Speed | LOS | Productivity | % Benchmark |
| Bus Lane | 25 | 2% | 722 | 33% | 20 | D | 14440 | 38% |
| General Lane | 1128 | 98% | 1455 | 67% | 19 | D | 27645 | 73% |
| Both Lane | 1153 | 100% | 2177 | 100% | | | 21043 | 55% |

| T2 Lane Scenario | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Mode | Volume | % | Person-trips | % | Speed | LOS | Productivity | % Benchmark |
| T2 Lane | 295 | 26% | 1320 | 61% | 16 | E | 21120 | 56% |
| General Lane | 857 | 74% | 857 | 39% | 22 | D | 18854 | 50% |
| Both Lane | 1153 | 100% | 2177 | 100% | | | 19987 | 53% |

| T3 Lane Scenario | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Mode | Volume | % | Person-trips | % | Speed | LOS | Productivity | % Benchmark |
| T3 Lane | 81 | 7% | 891 | 41% | 20 | D | 17824 | 47% |
| General Lane | 1072 | 93% | 1286 | 59% | 19 | D | 24432 | 65% |
| Both Lane | 1153 | 100% | 2177 | 100% | | | 21128 | 56% |

## 5.2 Cycle Routes / Auckland Cycle Network (ACN)

The Auckland Cycle Network (ACN) has been developed to improve the level of service provided for existing cyclists and to reduce the barriers that deter would-be cyclists from making cycle journeys. Its aim is to improve the safety, accessibility, convenience, connectivity and attractiveness of the Auckland travel network to better meet the needs of cyclists. Improved safety is the most important request made by existing cyclists and would-be cyclists in Auckland.

The ACN provides the core network for cyclists within the wider transport network of roads, footpaths, rail lines and ferry routes, across Auckland. It links the many land-uses including employment, education, town centres, and transport interchanges. It caters for the range of:

- cycling needs (journey purposes): commuters, students, personal business, recreation, sports
- abilities: novice, less experienced, confident, experienced, confident, sports cyclists.

A hierarchy of route standards makes up the ACN which provides a range of levels of service to users. This is made up of:

- Cycle Metros:
  - There two types of Cycle Metros
    - A. Strategic regional Cycle Metros: segregated from general traffic, providing for direct, longer distance journeys uninterrupted by frequent driveways and road junctions. These occur alongside major transport corridors such as motorways and railways, connecting metropolitan centres.
    - B. Cycle Metros: segregated from general traffic but could be interrupted by frequent driveways and road junctions. These occur alongside arterial and major collector roads or through parks and reserves.
- Cycle Connectors
  - Routes mainly along arterials to main destinations. Provided mainly by on-road cycle-routes.
- Cycle Feeders
  - Local routes on quietly trafficked roads or through parks and connecting between lower hierarchy localities and to higher level cycle routes. These routes are typically made up of way-marking signing and low level road markings

These are the minimum standards for the categories. Higher standards can be provided within these categories as appropriate.

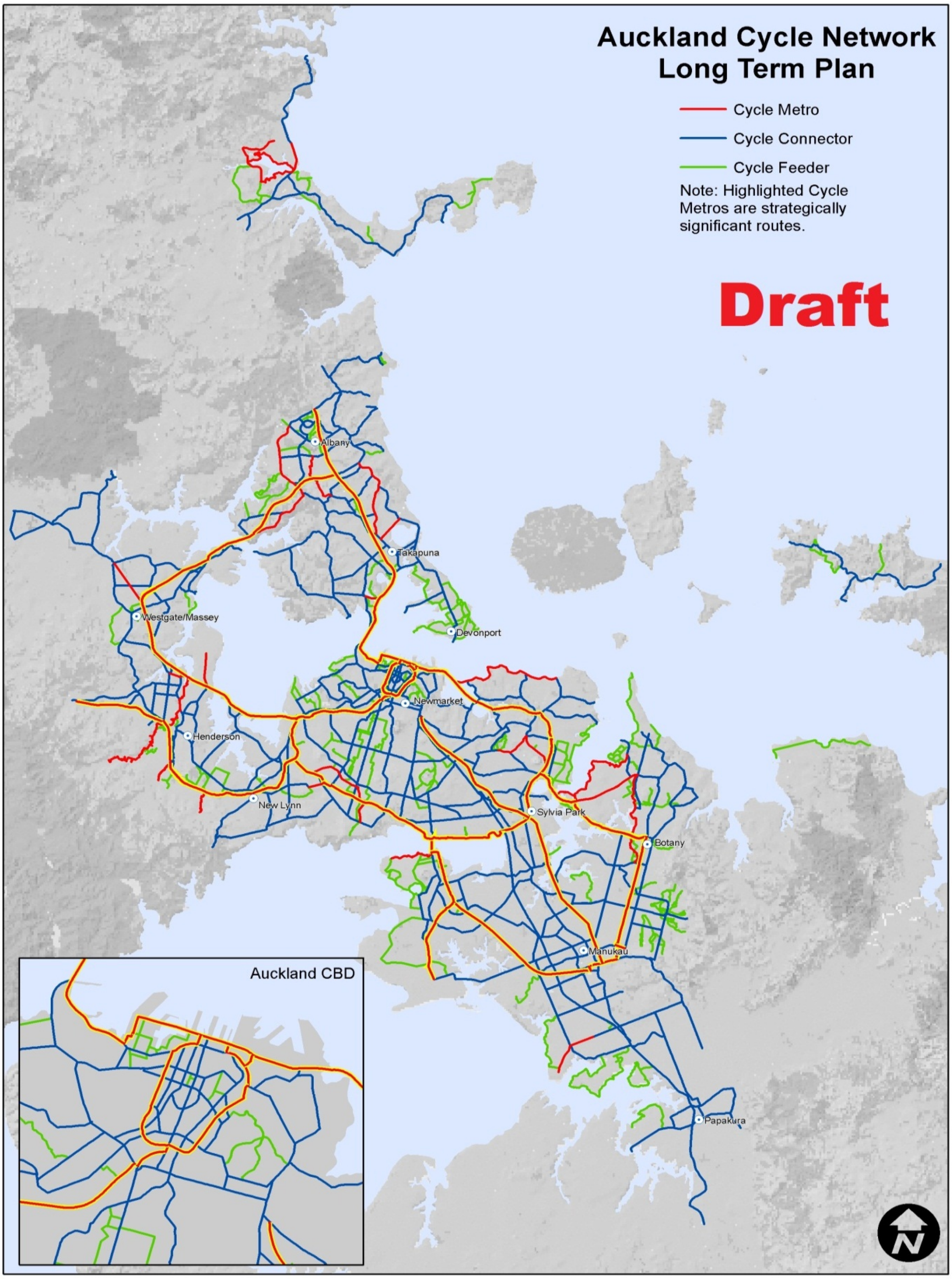



**Figure 28: Auckland Cycle Network (source: Auckland Transport 2012-2041 Integrated Transport Plan page 47, Figure 2.1h)**

## Cycle network features

A well connected cycle network enables cyclists of a wide range of abilities and experience to move safely, directly and conveniently to their chosen destination. Table 10 lists features that are required to form a good cycle network.

**Table 10: Bicycle Network Features** (adapted from Table 2.5 of Austroads: Cycling Aspects of Austroads Guide 2011)

| Route feature | Comments |
|---|---|
| Safety | Minimal risk of traffic-related injury, low perceived risk of danger, space to ride, minimum risk of conflict with vehicles and other road users such as pedestrians |
| Coherence | Infrastructure should form a coherent entity, link major trip origins and destinations, provide connectivity and continuity, is sign posted, is consistent in quality, be easy to follow, and have route options. |
| Directness | Routes should be direct, based on desire lines, have low delay through-routes for commuting, avoid detours and have efficient operating speeds. |
| Attractiveness | Provides adequate lighting, personal safety, aesthetics, integration with surrounding area, access to different activities. |
| Comfort | Smooth skid-resistant riding surface, gentle gradients, avoids complicated manoeuvres, reduced need to stop, minimum obstruction from vehicles. |

## Types of Cyclists and their Network Requirements

While the ACN is a broadly well-defined hierarchy of categories of routes, links can be upgraded from one level to another (e.g. from Cycle Connector to Cycle Metro) where the opportunity arises. Attention should be given to the likely range of cycling skills of users. Cyclists are diverse in their needs and may have a number of needs within a single trip. Seven groups of cyclists have been identified, each with specific riding characteristics and network requirements (see Section 2.3.6 of Austroads: Cycling Aspects of Austroads Guide 2011). There is usually a need to cater for more than one group in any given corridor.

Specific land-use patterns or origins and destinations in the project area should be a guide to the skill levels being catered for. Providing facilities for the least confident cyclists expected in the project area is the usual best practice.

The different categories are discussed in Table 11 below. The most typical groups in the Auckland context are school students and novice cyclists, commuter cyclists, recreational cyclists, utility cyclists and sporting cyclists.

**Table 11: Categories of cyclists and their characteristics (Adapted from Table 2.3 of Austroads: Cycling Aspects of Austroads Guide 2011)**

| Category | Rider characteristics | Riding environment |
|---|---|---|
| Primary school children<br>Novice cyclists | Cognitive skills not developed, little knowledge of road rules, require supervision. | Off-road path, footpath (where permitted) or very low volume, slow speed residential street. |
| Secondary school children and some intermediate school students | Skill varies, developing confidence. | Generally use less intimidating on-road facilities or off-road paths where available. |
| Recreational | Experience, age, skills vary greatly. | Desire off-road paths and quiet local streets, avoid heavily trafficked routes, more experienced prefer to use road system for long journeys. |
| Commuter | Vary in age, skill and fitness, some highly skilled and able to handle a variety of traffic conditions. | Some prefer paths or low-stress roads, willing to take longer to get to destinations, others want quick trips regardless of traffic conditions, primarily require space to ride, smooth riding surface and speed maintenance, includes skilled users of more highly trafficked arterials. |
| Utility | Ride for personal business purposes (e.g. shopping), shorter length trips, routes unpredictable. | Less likely to be on highly trafficked roads, needs to include comprehensive, low-stress routes, appropriate end of trip facilities. |
| Touring | Long distance journeys, may be heavily equipped, some travelling in groups. | Often route is similar to that of other tourists. |
| Sporting | Often in groups, two abreast occupying left traffic lane, needs similar to commuters, but higher cyclist speeds | Travel long distances in training on arterials, may include challenging terrain in outer urban or rural areas, generally do not use off-road routes because of need for high speed and wish to avoid conflict with other users. |

**Functions of a Bicycle Network**

There must be compatibility between the functions and components of a cycle network and the functions and components of the road network. When cycle routes run along or cross the links of the wider road network, the operational facilities should reflect the network functions of both networks.

Categories of cycle route hierarchy for the Auckland network are shown in Table 12, which relates the categories to their operational characteristics. For design details and standards for cycle facilities see *ATCOP Chapter 13 Cycle Infrastructure Design.*

## Auckland Cycle Network Categories

**Table 12: Bicycle network functions (Adapted from Table 2.3 of Austroads: Cycling Aspects of Austroads Guide 2011)**

| Category | Location | Treatment | Target users | Traffic volumes Indicative Cycle speeds | Constructed by | Characteristics/ Comments |
|---|---|---|---|---|---|---|
| **Cycle Metro** | • Motorway corridors<br>• Rail corridors<br>• Arterial corridors | • All users | • Regional rute connecting metropolitan centres<br>• Direct uninterrupted, traffic free<br>• Offer a high leel of safety | 15-40km/h<br><br>Few interruptios | **SEGRATION FROM TRAFFIC**<br>**Shared paths**<br>**Two-way protected cycle lanes** | AT |
| **Cycle Highway** | • Motorway corridors<br>• Rail corridors<br>• Arterial corridors | • Shared paths<br>• Two-way protected cycle lanes | • All users | >5,000<br><br>20-40km/h | NZTA<br>AT | Regional route connecting metropolitan centres<br><br>Direct, uninterrupted, traffic free |
| **Cycle Connector** | • Arterials<br>• Major collectors | • Kerbside cycle lanes<br>• Bus/cycle lanes<br>• Wide kerbside lanes<br>• Advance stop | • Competent cyclists<br>• Experienced cyclists | >5,000<br><br>20-40km/h | AT | Mixed traffic situations |

| Category | Location | Treatment | Target users | Traffic volumes Indicative Cycle speeds | Constructed by | Characteristics/ Comments |
|---|---|---|---|---|---|---|
| | | boxes<br>• Lead in lanes at intersections | | | | |
| **Feeder route** | • Local roads<br>• Parks and reserves | • Traffic calming<br>• Intersection priority<br>• Signage<br>• Sharrows<br>• Greenways | • Novice cyclists<br>• Inexperienced cyclists<br>• School children | <5,000<br><br>10-20km/h | AT<br>AC | Treatment similar to 'Cycling Boulevards' in Portland.<br><br>This category will be delivered by AT or through a partnership between AT and AC. |

**Important Note:**

1. Some corridors may require two or more forms of treatment i.e. Cycle Metro and Connector. These will be determined by the types of destinations on or around a corridor e.g. schools and workplaces. In this situation a shared path and kerbside lanes may be provided to cater for all types of users e.g. Albany Highway.

2. The project investigation process will determine whether Cycle Connectors shown on the ACN Plan can be recategorised as Cycle Metros.

3. The Cycle Feeder network is under development and will be identified through Local board Network Plans, AC Greenways and other methods.

4. The ACN is a strategic planning tool and should not be used for way finding.

## 5.3 Freight, Over-dimensional (OD) and Overweight (OW) Routes

### 5.3.1 Freight Routes

**Freight Movement**

The requirement to move freight exists throughout the network but is strongly concentrated in some areas while relatively infrequent and dispersed in other areas, influenced by land use.

The greatest concentration of freight movements occurs on arterial routes feeding to and from transport hubs such as,

- Ports of Auckland (Auckland Central and Onehunga)
- Auckland International Airport
- Rail interchange (Southdown, Wiri)

and feeding to and from inter-regional links

- State Highway 1 (to Northland and Waikato)

Within the region freight moves primarily on the State Highways, Motorways and arterial road network. In industrial areas freight movements also make up a substantial portion of the traffic on collector and local roads providing access to factories, warehouses and distribution centres.

Freight movements also extend into rural areas where major freight demand can occur on roads providing access to quarries, forests, orchards and dairy locations.

[GIS map of regional freight routes to be provided.]

**Designing for Freight Movement**

Consideration needs to be given to the demand for freight movements and the types of trucks being used in the area when designing roads. Standard trucks are up to 2.5m wide while cars are typically only 1.8m wide, an implication of this is that where freight volumes are high it may be desirable to allow more generous lane widths to accommodate trucks, (refer to *ATCOP Section 7.4* for relevant road cross-sections). Trucks also require more space when making turns and cannot turn as sharply. Consequently the demand for freight movement needs to be considered when selecting the design vehicle for tracking checks at sharp bends and intersections. Standard wheel tracking curves for a range of design vehicles are available (refer to the relevant tracking curves in *Chapter 7 Road Layout and Geometric Design, Section 7.5.2 Design Vehicles & Swept Path Analysis* and NZTA OD tracking curves).

## 5.3.2 Over-dimensional and Overweight Routes

**Over-dimensional and Overweight Movements**

While the majority of freight movements occur using vehicles that comply with the Land Transport Rule for Vehicle Dimensions and Mass, there are provisions for trucks to carry heavier divisible loads under High Productivity Motor Vehicle (HPMV) Permits and for indivisible loads exceeding mass and or dimension limits to be transported under Overweight and/or Over-dimensional Permits.

**Over-dimensional and Overweight Route Maps**

Transit New Zealand historically published a document specifying Over-dimensional and Overweight Routes throughout the country, some of these routes are on Auckland Transport's network. The Auckland Transport roads identified by the document serve as bypasses to the state highway network in locations where there are constraints on the state highway network such as limitations due to bridges.

Auckland Transport has identified some additional Over-dimensional and Overweight routes for freight movement within Auckland including the Overweight Collector Network, which is under development and should be checked with AT's Road Corridor Access Department's OW Permit Officer.

[GIS map of Overweight Collector Network routes to be provided.]

**Over-dimensional and Overweight Sections of the Arterial Road Network**

NZTA (TransitNZ) has produced a set of Overdimension Vehicle Route Maps for the Auckland Region dated November 2004, which can be viewed via the link: http://www.nzta.govt.nz/resources/overdimen-veh-route-maps/4-auckland/map-list.html

NZTA (TransitNZ) has similarly produced a set of Overweight Permit Route Maps for the Auckland Region dated July 2007, which can be viewed via the link: http://www.nzta.govt.nz/resources/overweight-permit-route-maps/3-auckland/map-list.html

Table 13 is based on information provided by the NZTA. The alternative overweight routes identified in this table, are described in the maps as "Alternative Auckland City Council Route only. Individual permits must be approved."

**Table 13: Auckland Region OD and OW Routes**

| Arterial | Over-dimensional Route | Overweight Permit Route |
|---|---|---|
| **Auckland Isthmus & Otahuhu** | | |
| Ash Street | • Full length: Rata Street to Great North Road | • Full length: Rata Street to Great North Road |
| Atkinson Avenue | • Full length: Portage Road to Great South Road | • Full length: Portage Road to Great South Road |
| Broadway | • From Khyber Pass Road to Manukau Road | • Alternative O/W route from Khyber Pass Road to Manukau Road |
| Carrington Road | • From Great North Road to Woodward Road | • From Great North Road to Woodward Road |
| Church Street | | • From Neilson Street to O'Rorke Road |
| Customs Street East and West | • From Fanshawe Street to Anzac Avenue | • From Fanshawe Street to Anzac Avenue |
| Ellerslie-Panmure Highway | • From Jellicoe Road Main Highway Intersection | • From Mt Wellington Highway to Lunn Avenue |
| Fanshawe Street | • From Beaumont Street to Customs Street | • From Beaumont Street to Customs Street |
| Great North Road: east of Whau River | • From Ash Street to Karangahape Road | • Alternative O/W route from Ash Street to Carrington Road<br>• O/W route from Carrington Road to Karangahape Road |
| Great South Road: Isthmus section | • From Broadway to Station Road<br>• From Southeastern Highway to Sylvia Park | • From Broadway to Sylvia Park Road |

| Arterial | Over-dimensional Route | Overweight Permit Route |
|---|---|---|
| | Road | |
| Karangahape Road | • Full length: Great North Road to Symonds Street | |
| Khyber Pass Road | • From Symonds Street to Nugent Street | |
| Kohimarama Road - Kepa Road – Ngapipi Road route | • Full length: St Johns Road to Tamaki Drive | |
| Manukau Road | • Manukau Road from Green Lane West to Pah Road | • Alternative O/W route from Broadway to Green Lane West<br>• O/W route from Green Lane West to Pah Road |
| Mount Albert Road | • From Owairaka Avenue to Pah Road | • From Owairaka Avenue to Mt Smart Road |
| Mount Smart Road | | • From Mt Albert Road to Mays Road |
| Mays Road | | • Full length from Mt Smart Road to Church Street |
| Mt Wellington Highway | • From Ellerslie-Panmure Highway to Atkinson Avenue | • From Ellerslie-Panmure Highway to Waipuna Road<br>• From Sylvia Park Road to Atkinson Avenue |
| Neilson Street: SH20 Interchange Onehunga Mall | | • From Selwyn Street to Onehunga Mall<br>• From Galway Street to Church Street |
| Newton Road | • Full length: Khyber Pass to Great North Road | |

| Arterial | Over-dimensional Route | Overweight Permit Route |
|---|---|---|
| Pah Road | • Full length: Manukau Road to Queenstown Road | • Full length: Manukau Road to Queenstown Road |
| Quay Street | • From Britomart Place to The Strand | |
| Queenstown Road | | • From Pah Road to Beachcroft Avenue |
| Remuera Road | • From St Johns Road to Market Road | |
| St Lukes Road – Balmoral Road – Green Lane East | • From Great North Road to Great South Road | • From Mt Eden Road to Great South Road |
| South Eastern Highway | • From O'Rorke Road to Great South Road | • From O'Rorke Road to Great South Road |
| St Johns Road | • Full length: Kohimarama Road to Remuera Road | |
| Sylvia Park Road | • Full length: Mt Wellington Highway to Great South Road | • Full length: Mt Wellington Highway to Great South Road |
| Symonds Street – Anzac Avenue | • Full length: Newton Road to Customs Street | • Full length: Newton Road to Customs Street |
| Tamaki Drive | • From The Strand to Ngapipi Road | |
| Waipuna Road | • Full length: SE Highway to Mt Wellington Highway | |
| • **Southern Auckland (Manukau, Papakura and Franklin)** | | |
| Beach Road, Papakura | • From Papakura | |

| Arterial | Over-dimensional Route | Overweight Permit Route |
|---|---|---|
| | Interchange to Great South Road | |
| East Street – Pukekohe East Road | • Full length: Pukekohe to SH1 Bombay Interchange | |
| East Tamaki Drive | • Full length: Great South Road to Springs Road | |
| Great South Road | • From Atkinson Avenue to Drury Interchange | • From Atkinson Avenue to Drury Interchange except for Queen Street to Wellington Street, Papakura |
| Harris Road – Springs Road route | • Full length: Ti Rakau Drive to East Tamaki Road | |
| Glenbrook Road route | • Full length: SH22 to Glenbrook<br>(SH22 not included in this Plan) | |
| Manukau Road – Buckland Road – George Street route | • Full length: Pukekohe to Tuakau | |
| Massey Road – Mangere Road route | • From SH20 Massey Road Interchange to Atkinson Avenue | |
| Pakuranga Road | • From Ti Rakau Drive to Howick | |
| Pakuranga Motorway | • Full length: Ti Rakau Drive to SE Highway/Waipuna Road | |

| Arterial | Over-dimensional Route | Overweight Permit Route |
|---|---|---|
| Ti Rakau Drive | • From Pakuranga Road to Te Irirangi Drive | |
| Te Irirangi Drive | | • Full length: Ti Rakau Drive to Great South Road |
| Whangarata Road – Pokeno Road route | • Full length: Tuakau to Pokeno | |
| Whitford Maraetai Road – Maraetai Drive route | • From Beachland Road to Rewa Road | |
| • **Northern Auckland (North Shore & Rodney)** | | |
| Albany Highway | • Full length: Oteha Valley Road to Glenfield Road | • Full length: Oteha Valley Road to Glenfield Road |
| Anzac Street | • Lake Road to Fred Thomas Dr | |
| Birkenhead Avenue | • Full length: Glenfield Road to Onewa Road | |
| Coatesville Riverhead Highway | • Full length: SH17 to SH16 | |
| East Coast Road | • Oteha Valley Road to Sartors Avenue | |
| Glenfield Road | • Full length: Albany Highway to Birkenhead Avenue | • From Albany Highway to Wairau Road |
| Kahikatea Flat Road – Pine Valley Road route | • Full length: SH17 to SH16 | |
| Lake Road | • From Esmonde Road to Albert Road, Devonport | |

| Arterial | Over-dimensional Route | Overweight Permit Route |
|---|---|---|
| Northcote Road | • From Taharto Road to Akoranga Drive | • From Taharto Road to Akoranga Drive |
| Onewa Road | • From Birkenhead Avenue to SH1 Onewa interchange | • From Lake Road to SH1 Onewa Interchange |
| Oteha Valley Road | • Full length: East Coast Road to Albany Highway | |
| Wairau Road | • From Glenfield Road to Porana Road | • From Glenfield Road to Taharoto Road |
| SH1 Hibiscus Coast Highway | • From West Hoe Road (Orewa) to SH1 Silverdale Interchange | |
| Dairy Flat Highway - Library Lane | • From SH1 Silverdale Interchange to Albany Expressway | • From The Avenue, Albany Village to Albany Expressway |
| Taharoto Road | • From Shakespeare Road to Anzac Avenue | • From Shakespeare Road to Northcote Road |
| Upper Harbour Drive | • From Albany Highway to Tauhinu Road, Greenhithe | • From Albany Highway to Tauhinu Road, Greenhithe |
| Whangaparaoa Road | • From Whangaparaoa Town Centre to Hibiscus Coast Hwy. | |
| • **Western Auckland (Waitakere City & Rodney)** | | |
| Brigham Creek Road | | • Full length: SH16 to Hobsonville Road |
| Don Buck Road | • From Hobsonville Road to Triangle Road | • From Hobsonville Road to Triangle Road |

| Arterial | Over-dimensional Route | Overweight Permit Route |
|---|---|---|
| Great North Road | • From Lincoln Road to Rata Street<br>• From Rata Street to Clark Street | • From Sel Peacock Drive to Rata Street<br>• Alternative O/W route from Rata Street to Clark Street |
| Hobsonville Road | • From Buckley Ave to Don Buck Road | • From Buckley Road to Don Buck Road |
| Lincoln Road | • From Triangle Road to Great North Road | • From Triangle Road to Sel Peacock Drive |
| Rata Street | • Full length: Great North Road to Ash Street | • Full length: Great North Road to Ash Street |
| Sel Peacock Drive | • From Lincoln Road to Great North Road | • From Lincoln Road to Great North Road |
| Triangle Road | • Full length: Don Buck Drive to Lincoln Road | • Full length: Don Buck Drive to Lincoln Road |
| Fred Taylor Drive | • From Brigham Creek Rd to Hobsonville Road<br>(SH16 north of Brigham Creek Road not included in this Plan) | • From Brigham Creek Road to Hobsonville Road |

**Over-dimensional Permits**

Over-dimensional Permits are issued by NZTA for vehicles and/or loads that exceed the standard length, width and height limits. The operator of a vehicle on an Over-dimensional permit is obligated to ensure that the route they propose using is suitable to accommodate the dimensions of the load being shifted. Depending upon the size of the load and the degree to which the standard is exceeded - there are differing requirements for the times of day/night they can operate and the number of piloting vehicles required to escort the load. There is also a need for power, telephone, traffic signal and Kiwirail servicemen to attend to move infrastructure out of the path of large loads or repair resultant damage.

**Overweight Permits**

Overweight Permits are issued by Auckland Transport for special vehicles (e.g. mobile cranes) and for special transporters to carry overweight indivisible loads. These vehicles generally have special axle and wheel configurations to deal with the distribution of the additional load onto the road surface but will potentially place greater demands on pavements and place higher structural demands on bridges and culverts.

**High Productivity Motor Vehicle (HPMV) Permits**

HPMV permits can be issued by NZTA with input from Auckland Transport to allow specific types of vehicles to carry divisible loads that exceed the maximum gross mass of 44 tonnes on specific routes. HPMVs appear to be normal trucks although they can be slightly longer and have more axles than standard trucks. These vehicles should be able to comply with standard HT tracking curves but can place greater stress on pavements due to higher axle loads and in the case of quad axle trailers, lateral forces on the pavement surface when turning. They also can place greater stress on structures and larger span bridges through the increased gross weight.

**Designing for Over-dimensional/Overweight/HPMV routes**

There are a number of issues to be considered in designing roads where Over-dimensional/Overweight/HPMVs may need to operate.

- **Pavement Design**

The design of pavements on major roads is typically a specific design taking into account the expected heavy vehicle volumes over the life of the pavement. However, particular regard needs to be given to the possibility of a freight route being used by HPMVs in future as the heavier axle loads for HPMVs will require a stronger pavement to maintain the same pavement life and attention to surface treatment to withstand higher lateral forces. Standard chip seal surfaces may not withstand lateral forces and could strip.

**Provision for weigh stations**

The lack of opportunity for the weighing of trucks on the Auckland Transport network limits the ability for the Police Heavy Vehicle Enforcement Unit to monitor and enforce loading limits on trucks. It is desirable when designing projects on major freight and potential HPMV routes to provide suitable sites for the pulling over and weighing of trucks so that enforcement can be carried out as this has benefits for Auckland Transport in protecting our pavements from the effects of overloading.

- **Design loads for Structures**

For the construction and renewal of structures such as bridges and culverts consideration should be given to whether the route is potentially required for Over Weight or HPMV movements, as this may require the adoption of higher design loads for the structure.

- **Over-dimensional specification**

The New Zealand Heavy Haulage Association (NZHHA) has published 'Road Design Specifications for Over-dimensional Loads' (current latest version is Revision 4 – March 2010). This specification should be considered when designing Over-dimensional routes. The NZHHA proposes an OD envelope of 11.5m wide x 6.5m high. AT will endeavour to provide this larger envelope on all OD routes. However, particular attention is drawn to part 1.2 of the aforementioned specification which acknowledges the status of the document as a guideline and that its requirements will not be possible to be met in all situations. It should be recognised that some existing Over-dimensional routes already contain constraints that conflict with the guideline and in some cases there are conflicting design issues that compete with the desires of the Over-dimensional transport industry.

These issues include:

- Existing Utilities: both poles close to the carriageway and overhead lines at the minimum legal clearance above the road.
- Existing street trees.
- Pedestrian crossings: the legal maximum length for a pedestrian crossing is 10 metres and the requirement for belisha poles in close proximity to each end of the crossing does not allow a clear 11.5m between the poles where pedestrian crossings are provided. Removable poles must be provided at these localities.
- For driver visibility the preferred maximum mounting height to the underside of lanterns on overhead signal arms is 5.8m, which is lower than 6.5m. Because of this - rotating outreach arms must be provided on OD routes so that overhead outreach arms can be swivelled out of the way of high loads.
- The Rail Corridor is a potential constraint to movement of Over-dimensional and Overweight loads. Level crossings within the urban area are now subject to signposted height restrictions to maintain electrical clearance to the overhead power supply for the trains. Grade separated crossings are also constrained with rail over road bridges often restricting the height of loads and road over rail bridges potentially limiting the weight of loads. Guidance on this can be provided by AT's Road Corridor Access Co-ordination Team.

[The latest GIS map showing Over-dimensional/Overweight/HPMV Routes is to be provided.]

## 5.4 Pedestrian Access Ways

Safe Pedestrian Access Ways (PAWs) are core elements of a well-designed neighbourhood. A PAW will generally be required where it would provide a significantly shorter walking route between roads or from a road to a reserve, shopping centre, community facility or to public transport facilities such as bus routes, rail stations etc.

Unfortunately, many of our older suburbs in Auckland include a wide variety of PAWs that are currently unsafe and are perceived by many as simply being dangerous places to walk through (refer to image below).

Auckland Transport policy is to maintain these PAWs and enhance them where possible to ensure that they continue to positively serve their respective neighbourhoods far into the future. Therefore it is critical that all new and/or existing connections should follow the guidelines listed below to ensure that all of our neighbourhoods have good access to safe, convenient walking and cycling connections to provide a variety of travel options to residents other than the motor vehicle.

**Accessway Locations**

Pedestrian and cycle facilities should generally be an integral part of a road. Pedestrian and cyclist accessways provide links where there is no road and should be considered at:

- cul-de-sac heads to provide a link to an adjacent road;
- parks and reserves where part of that reserve has no road frontage;
- schools and other community facilities where part of that facility has no road frontage; and
- any other location where the trip by road would be considerably longer than 'as the crow flies'.

Where a road connection would not be entirely necessary for traffic circulation, a pedestrian and cycle connection will often still be required to provide access for these active modes. Acceptance of a pedestrian and cycle only connection may be approved where AT concludes that the provision of a road is not reasonable or cannot physically be constructed.

The following set of guidelines for the development of quality pedestrian access routes in new developments shall include a number of important elements such as: hard surfaces, landscaped and vegetated areas, street furniture, proper lighting; good sightlines (both through and along) and opportunities for informal surveillance should be provided, and PAWs should be fully accessible to all users.

The various guidelines and requirements applicable to PAWs that exist in the various legacy council District Plans remain applicable until replaced by the Unitary Plan.

**For all new PAWs, AT requires the following:**

- PAWs must be designed and constructed in a manner, which makes them safe, attractive and convenient and should include the following:
    - Landscaping, including trees, but not bushes and other elements that would create a visual barrier.
    - Lighting of all pedestrian and cycle access ways must be in accordance with AS/NZS 1158 (and subsequent revisions) as described in *ATCOP Chapter 19 Street Lighting* (refer to *Section 19.3* for Accessway Lighting guidance), and must be done in such a way as to provide no more illumination that is necessary for security and safety. Pedestrian access ways must have lights located at each end and at not more than 50m centres along the length of the access way.
    - Bicycle or pedestrian path lighting is to be located or mounted so as to minimise light shining upon residential windows or into the eyes or drivers, pedestrians or cyclists. In some cases it may be appropriate not to light a PAW so as to discourage its use in the hours of darkness.
    - The PAW must be designed to generally prevent use by vehicular traffic (emergency access should be considered) and designed to limit the speed of cyclists and other users to ensure a safe but convenient link. Barriers which force users to dismount their bicycles are discouraged.
    - The PAW should be integrated with the local pedestrian and cycle movement network and wherever possible orientated to reinforce the visual link between local landmarks and local attractions to assist in the orientation of pedestrians and other users;
- The length of a PAW should be the shortest route between 2 streets and should not exceed 70 metres;
- A recommended width of 8 metres where connecting one minor road to another.

The intent is to provide an 8 m PAW reserve of which a maximum 3m width would be paved and the rest grassed or treed.

Where a width of 8 m is exceeded, the area concerned should be regarded as a Local Purpose Reserve vesting in Auckland Council’s Parks Department;

- Where the PAW is located at a cul-de-sac head that almost abuts a major road, parkland neighbouring development, or area with future development potential the PAW shall be equal to the road reserve width of the minor road;

- All pedestrian accessways should have a straight horizontal alignment and a vertical alignment, with a desired maximum gradient of 1 in 10 and an absolute maximum gradient of 1 in 5. However, the accessway should be visible from end to end from an eye height of 1.5m;
- Pedestrian accessways should have 'security' style fencing erected both sides of the accessway to a height of 1.8m. This shall consist of diamond mesh galvanised steel fencing to allow full visibility and prevent graffiti;
- To increase security for those lots abutting the PAW and the safety of pedestrians using the PAW, uninterrupted sight lines shall be provided for the entire length of the PAW.

For existing PAWs where no opportunities for widening are feasible, AT requires the following aspects to be assessed to improve the PAW:

- clearly defining the ownership and use of PAWs (rapidly removing graffiti, quickly repairing damage, upgrading walking surfaces);
- improving surveillance (improved lighting, safety mirrors, clearing shrubs and overhanging vegetation, electronic surveillance, deploying CCTV cameras);
- setting rules and defining activities (installing signs);
- hardening adjacent properties against damage and illegal access (installing density matting and/or climbing plants on blank walls to reduce graffiti, removing physical objects that would aid illegal access);
- controlling access (with bollards or using gates to deny access at vulnerable times such as sunset to sunrise);
- applying additional security measures for PAWs with significant crime problems (lighting, deploying CCTV cameras, police/security patrols); and
- other "generic" designing-out crime issues/solutions.

**Sources:**

Procedure for the Closure of Pedestrian AccessWays, Western Australian Planning Commission, October 2009

Section 3 Transportation, Code of Practice for City Infrastructure and Land Development, Waitakere City Council, June 2010

## 5.5 Shared Spaces and Shared Zones

### 5.5.1 Purpose

This section provides a set of operational principles for the creation of a shared space scheme. The aim of these principles is to ensure that a level of consistency is delivered throughout all of the shared space schemes in Auckland. The principles have been developed in consultation with stakeholders including Road Corridor Operations, Parking and Enforcement, Investigation and Design and Infrastructure Development (CBD Streetscapes) departments.

It is intended that designers and policy makers should utilise these principles in developing schemes to understand Auckland Transport's requirements for the operation of a shared space. Shared space designs will be reviewed against the principles to ensure they incorporate the key elements outlined so that there is consistency in operation between spaces and that the operational aims are achieved through effective and appropriate design.

Designs through all stages of a project from concept to detail design should be developed with close consultation and input from key Auckland Transport stakeholders, particularly Road Corridor Operations.

Although this section has been developed for projects within the legal road reserve, adoption of the principles to other spaces would be advantageous so that the public is provided with consistency and clear legibility of shared spaces across the region.

### 5.5.2 Shared Space Overview

Even though the recent surge of the use of the term 'Shared Space' and its applications in New Zealand is largely influenced by the work of a European Shared Space project (2004-2008) and the UK's Department for Transport Studies (2009-2011), the concept of various street users sharing the same public road space is not new. The first Shared Spaces were developed after the pinnacle of the automobile era in the 1960s. Their creation can be traced back to the philosophical concept of an 'environment area' in the Traffic in Towns (1963); commonly known as 'the Buchanan Report'. The theoretical construct for road user integration, especially between vehicle and pedestrian, was first embodied in the form of a residential shared street in the Netherlands ('Woonerf'). The concept was recognised by the Netherlands government with legal status and formal traffic guidelines and regulations.

The typical design and operational characteristics for a residential shared space (or 'Home Zone') can be summarised as follows:

a) Pedestrians have priority to use the full width of the road. Drivers are urged not to drive faster than walking speeds.
b) There is little demarcation between carriageway and footpath, including the minimisation of signage and road marking. The entire width is often constructed in a continuous surface with special pavers.
c) Vehicular through-traffic is discouraged. Vehicle dominance (speed and volume) is restricted by street design (e.g. horizontal curves, bollards and parking layout).
d) Streetscape elements are designed to encourage people to stay within the space.
e) The access points to the shared street are clearly marked.

With these vehicular restraining features to enhance liveability in residential neighbourhood environments, the Woonerf idea swept through Europe in the 1970s. Its design guidelines for shared spaces were adopted in many countries, and extended to town centres and shopping areas. The same concept also evolved into traffic calming principles and Local Area Traffic Management. Although different, but comparable design approaches (e.g. liveable streets, self-explaining roads, civilised streets, road diet and context-sensitive designs) are used to emphasise the place function and the need to reduce the vehicular dominance within the road reserve, a shared space is distinguished from these by its aim to remove the segregation between vehicles and pedestrians (e.g. omitting vertical kerbs or distinct surface materials and eliminating/reducing road markings and signage).

While the concept of road user integration is not new, the idea of encouraging the mixing of slower-speed, smaller-mass pedestrians with higher-speed, larger-mass vehicles is no doubt novel, particularly after the widespread automobile domination in public road space. The renewed interests of the Shared Space concept reaffirm the multi-faceted functions of a public street, including the place function as well as the shifting public demand and expectations away from the automobile towards sustainable and safe transport.

A form of shared space with specific legal recognition in New Zealand is the 'Shared Zone'; which is defined in the Land Transport (Road User) Rule 2004 as simply "*a length of roadway intended to be used by pedestrians and vehicles*."

The interaction between different road users in a shared zone is controlled under the Rule as follows:

Clause *10.2* *Shared zone*

*(1) A driver of a vehicle entering or proceeding along or through a shared zone must give way to a pedestrian who is in the shared zone.*
*(2) A pedestrian in a shared zone must not unduly impede the passage of any vehicle in the shared zone.*

This definition of shared zone might be seen to apply in a range of situations where pedestrians and vehicles share an area, for example an off street car park without specific footpaths or where a vehicle crossing intersects a footpath. However, the Auckland Transport Traffic Bylaw 2012 allows for a resolution to be passed to specifically indicate an intention to form a shared space in a road as a shared zone. The bylaw also specifies that by default parking is prohibited in such shared zones. The bylaw states:

Clause *13* *Shared Zones*

*(1) Auckland Transport may by resolution specify any road to be a shared zone*
*(2) Except where Auckland Transport has by resolution specified otherwise, no person may stand or park a vehicle in a road specified as a shared zone.*
*(3) A person must not use a shared zone in a manner contrary to any restriction made by Auckland Transport.*

The design principles specified here are intended to apply in these specifically resolved shared zones.

## 5.5.3 Design Principles

Shared space is simply one urban design outcome among many other tools that can be used in a public road space. It may not always be the best solution and is not necessarily appropriate to be implemented in all locations or situations. The objectives of the project should be carefully identified prior to selecting shared space as the solution, giving clear consideration to the context of the street being upgraded, the requirements for place-making and the need to accommodate the movement of people (e.g. pedestrians, cycles, motor vehicles, loading).

The operational design principles have been developed to:

- Provide details of fundamental aspects that should exist in the environment of the shared space to maximise the chances of the space operating successfully.
- Ensure commonality and legibility for end-users so that they easily understand that the area is a shared space and what is expected of them - irrespective of the location.

It is not intended that common materials or design be used in each shared space, simply that the principles are applied for the ease of each particular user to assist them in understanding the environment.

Given the aforementioned overview, it is important to recognise that this document is intended for shared spaces within the public road space (as opposed to open space or private area) where all road users (including pedestrians, cyclists, vehicles and the disabled) are encouraged by design to legally interact, share and occupy the same public space. If shared space is used outside of the legal road reserve, it would be beneficial to adopt these principles to assist in providing a coordinated and consistent approach throughout the region.

The following provides the key design principles that must be considered for new or modified shared space schemes:

3 The distinct street design must be context-sensitive, taking into account the surrounding land-use and the complementary street functions of economic, social, cultural, historical and environmental amenity.

4 Designers should identify the range of movement and activities that the space is expected to provide at different times of the day, and give due regard to changes of use between day time and night time operation. Layout and streetscape features should be provided to meet these intentions and to enable appropriate use of the street space, such as outdoor dining.

5 The scheme should generally attempt to limit vehicular dominance, volumes and speed. Traffic calming measures, such as lateral shifting of horizontal alignments, and street closures, can be employed to restrict vehicular movements and speeds. Based on the walking speed criteria, the recommended design speed should be 10km/h. Designers need to demonstrate how such speed is to be achieved. It is desirable to have a posted

speed limit of 10km/h in accordance with the Land Transport Rule: Setting of Speed Limits 2003, to reinforce to motorists the requirement for slow speeds.

6 Based on the AT research publication for town centre areas, the influence of pedestrian density on reducing vehicular speeds is most effective in the zone with the highest active land-use frontage. Active frontage can be defined as the distance along a property boundary that provides the opportunity for people movement into and out of buildings, along and across the street or for street activity (such as street dining). Schemes should generally only be considered where there is a significant proportion of active street frontage along the street or where there are significant pedestrian movements within the street, both laterally and transversely. These characteristics help to lower vehicle speeds and limit the dominance of motor vehicles in the space. Where active frontage is limited, designers need to consider if the street is appropriate for shared space.

7 The design should be self-explaining as far as possible to reduce the need for traffic control devices (e.g. signs and road markings). Such devices should be used sparingly or avoided within the zone.

8 The design should clearly indicate where motorists should not drive and (where permitted) should not park. The layout should ensure drivers are not given the impression of priority over other road users when using the vehicle zone. The design should consider not only the preferred movement and occupying spaces for vehicles and pedestrians, but also the likely behaviour of the full range of users. The requirement for vehicles to make reverse manoeuvres within the space should be avoided where possible for safety and to reduce the risk of vehicles damaging street furniture.

9 Parking should generally be avoided within a shared zone. Loading within the shared zone may be required where there are no alternatives. In such cases, this should be limited to only a short period of the day to minimise conflicts with other users when the space is most used by pedestrians.

10 To cater for the visually impaired, mobility impaired and other vulnerable road users (including young and old), a safe accessible (vehicle free) zone on either side of the street, clear of obstacles and street furniture, with a minimum width of 1.8m is required. A minimum 600mm wide tactile delineator band between the safe accessible zone and adjacent areas is recommended to warn users of the possibility of street furniture and moving vehicles.

11 Street cross-sections will tend to be individual and differ from conventional streets. Therefore, special attention needs to be given to drainage, to meet serviceability for pedestrians and to avoid flood risk. There may be opportunities to combine water quality treatment devices such as rain gardens with streetscape features. Road drainage design should follow the AT Stormwater Guidelines and ATCOP Chapter 17 Road Drainage design principles. Where possible, reliance on long lengths of drainage channels or gratings should be avoided as these can be interpreted by users, particularly motorists, as defining the edge of a carriageway. This can lead to higher than desirable vehicle speeds.

12 Designs will typically consist of a level surface continuous across the road reserve without an obvious or no vertical elevation difference (i.e. kerb) between what would normally be the road carriageway and the footpath areas. Similar paving materials and

colours between the vehicle zone and the rest of the street space should be used to promote pedestrian movements over the full width of the street environment.

13 Street furniture (such as trees, art works, bollards, lighting) should be used to define the various zones within the shared space, act as traffic calming measures (speed and traffic volume reduction features) and provide functional aspects such as seating, drainage or lighting. In order to encourage slower speeds furniture must be strategically placed to reduce the appearance of the street to motorists as a straight linear feature. The size, nature and placement of street furniture must be such that it minimises the risk of being struck by a vehicle, particularly for any manoeuvring vehicle, by maximising visibility of the object at the driver's eye height. Visibility around the space should be maintained so there are no hiding places which may mask pedestrians from motorists (and vice-versa) or result in negating CPTED (Crime Prevention Through Environmental Design) principles.

14 Street Lighting should be as described in *Chapter 19 Street Lighting* and in accordance with AS/NZS 1158 (and subsequent revisions). No more illumination should be provided than is necessary for security and to provide a safe attractive night time environment.

15 Choice of materials and street furniture must be selected to enable cost effective and practical maintenance. Bespoke furniture for a scheme should ideally be avoided as this delays the replacement of the particular item and can significantly increase future maintenance costs.

16 The entry and exit points to the zone should be clearly marked in accordance with the Traffic Control Devices Manual. A gateway treatment must be implemented at the zone transition. This should include clear and unobscured regulatory signage at a height that is readily visible when entering the zone from all directions. It should be made clear to all road users, by design as well as signage, when they are entering or leaving a shared zone. This should include points within the zone where significant numbers of path users enter the zone, from a walkway, public space or major destination. All necessary TGSI's (Tactile Ground Surface Indicators) should be provided at the entry and exit points to ensure these zones are safe and accessible for all users.

17 Any scheme should be accompanied by extensive education of the public to enable them to appreciate what is expected of them when using a shared space and how to behave. Design consistency of the fundamental aspects is essential to ensure users recognise the characteristics of a formal shared space when moving from one area to another. Streets should not be designed to have the look and feel of a shared space if it is not proposed that they formally be designated as a Shared Zone.



### 5.5.4 Approval Process

It is recommended that any new shared space proposal (including those of private development to be vested as public road) should be reviewed and developed with input from Auckland Transport at concept stage and throughout the development of the proposal with the Traffic Operations Manager in Road Corridor Operations as the first point of contact.

The design should be approved by Auckland Transport's Traffic Control Committee before implementation to ensure that the scheme is compliant with the above criteria, or where it departs, that this departure is approved.

### 5.5.5 Monitoring

It is expected that the project sponsor will ensure that the project will be monitored after implementation and that there is an allocated budget to provide any modifications or fine tuning to address operational or safety issues. This is essential as both New Zealand and overseas experience has demonstrated that schemes rarely operate completely satisfactorily when first opened.

### 5.5.6 Home Zones

For residential shared spaces (i.e. home zones), all of the aforementioned design principles are generally applicable, but with the following further considerations:

- Rather than relying on active frontage for user interactions in the case of non-residential shared spaces in activity centres, a home zone implementation looks to the residents and local communities for the sense of ownership in utilising and maintaining the public (road) space.
- The motor vehicular movements should be strictly restrained. A residential shared zone should only cater for vehicle traffic generated specifically for the immediate local community it is designed for.
- The design and location of on-street parking spaces within a home zone should be restricted in number and time only to cater for the local residents.
- Community focal points and facilities are to be provided to reinforce the community interactions.

To this end, community and residents' inputs and involvements are critical to the success of a home zone. For new development, where there is no existing community to share in design, the designer and project team should take account of the type of homes to be provided or permitted, and the character of the community that can be expected to occupy them. It is recommended that a covenant, acknowledging the home zone objectives and expectations, be registered on the certificates of title for the residential sites fronting the residential shared space.

### 5.5.7 Pedestrian Malls

The purpose of this section is not to provide comprehensive design guidelines for pedestrian malls, but rather encourage the designer to consider an option of a pedestrian mall in place of a shared zone where there are overwhelming numbers of pedestrians (in comparison to motor vehicles). Pedestrian malls would be appropriate or desirable where the road space is to be predominantly utilised for place functions rather than vehicular through movement and where the surrounding traffic network could function adequately without vehicles being able to use the road concerned as a through route for vehicles.

Unlike shared spaces that enable vehicles and pedestrians to legally share a road, the pedestrian mall can either prohibit vehicles from using the road at all times or at specific times. For example, this type of restriction might be made for regular events on a road e.g. a street market. A pedestrian mall option may be considered the most effective way to manage the regular closure of a road, for example, for a weekly farmers market, because it entails less administrative time and costs for ongoing consideration of temporary road closure applications and allows for more than 31 event based closures of the same road in one year (which is the limit under the temporary road closure rules).

Pedestrian mall prohibitions on vehicles can be applied to all vehicles or crafted so as to allow for some authorised vehicles to drive within its boundaries. For example, vehicles belonging to or visiting properties with frontage onto the pedestrian mall may be authorised to drive through the pedestrian mall. The rules that apply to vehicles and pedestrians in shared zones would apply in relation to an authorised vehicle in a pedestrian mall.

The statutory process for declaring that a road (or part of a road) is a pedestrian mall is set out in section 336 of the Local Government Act 1974. It states that the special consultative procedure from section 83 of the Local Government Act 2002 must be used. It also sets out that there is a one month period after any decision to declare a pedestrian mall when an appeal can be made to the environment Court against the decision that is provided for in section 83.

The power to declare a pedestrian mall has been delegated to the Traffic Control Committee.