Bus and Transit Lanes Review - Planning and Implementation Model for Auckland - July 2011

Purpose

The purpose of this study is two-fold:

- To put forward 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;
- To arrive at standard templates for bus and transit lanes, generic to all locations, to be used for bus and transit lanes: BUS ONLY, BUS LANE, T2 and T3 transit lanes, across the region.

Executive Summary

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.

Bus and transit lanes have been introduced in Auckland in recent years, following the example of many cities across the world. In Auckland, the introduction of these lanes have been largely initiated at a strategic level and related to regional planning strategies. In each instance, designs were implemented from a local perspective, resulting in bus and transit lanes across the Auckland region appearing different from one previous legacy council area to another. This has partially compromised the use of bus and transit lanes in terms of usability, driver recognition and compliance. The latter has made enforcement challenging and contentious with the driving public. A consistent and clear approach to demarcating these lanes is therefore critical in minimising inadvertant infringement of these lanes.

The purpose of this study is as stated above, and the document looks to provide clarity around the need for and use of bus and transit lanes, and in doing so sets out to show:

- 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.

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 means an effective and efficient public transport (PT) system that is able to accommodate the future travel demands of a growing city.

Future growth is inevitable, and looking ahead 40-50 years, Auckland's population will be at least two million people. To effectively accommodate this growth, the transport system will require a PT network that can carry at least 200 million passenger trips annually between regional centres across Auckland, at high frequencies with reliable travel times.

To achieve these objectives, PT patronage needs to increase substantially, with a resultant need to expand the PT system, including providing greater ease of travel for PT on several key arterials. 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. It is in this context that bus and transit lanes are both beneficial and necessary.

The policy put forward in this document provides some transparency and guidance to the implementation of appropriate bus and 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.

In this regard, the assessment of the following five routes suggests the following outcomes:

- Dominion Road : retain the current bus lane configuration
- Fanshawe Street : retain the current bus lane configuration
- Onewa Road : retain the current T3 lane configuration
- Remuera Road : retain the current bus lane configuration, and undertake further monitoring to confirm the current assessment
- Tamaki Drive : permanently change the Bus lane to T2 lane configuration

With regards to the physical appearance of bus and transit lanes, an extensive review of current practice abroad has informed improvements to be introduced to the current Auckland experience. A recent change in the Traffic Control Devices (TCD) Rule by NZTA has also 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. The change will result in the reduction of signage necessary along the route, and in turn facilitates clarity to road users.

Moving forward, a series of templates have been devised to cover the signage and markings of bus lanes and transit lanes, providing standardised treatments for the region, and which also addresses current and historical confusion related to the appearance of these lanes.

The templates concentrate on simplifying and clarifying line marking and signage associated with these lanes. Of particular significance is the recommendation to use a solid green and white line demarcating the bus or transit lane, as opposed to the single white line currently being used. A second key element is the use of a 50m indicator arrow, and broken lines to better reflect where drivers may cross into the bus or transit lane in order to turn off the route.

It is anticipated that inadvertent infringement of bus and transit lanes will be significantly minimised through these measures. These are to be trialled and, if assessed to be beneficial, implementation of these elements are to be rolled out across the region going forward, and applied to any upcoming implementations. This forms part of an action plan expected to run for the next three years, to bring all bus and transit lanes up to a clearer and uniform standard.

Communication and educational campaigns are to play key roles going forward, and enforcement remains necessary and will include monitoring of the lanes to inform how well the signage and line markings are being understood by the driving public.

The development of uniform principals for assessment and implementation of bus and transit lanes now allows Auckland Transport to work toward achieving consistency and clarity across the region. An action plan for the 2011/2012 financial year is proposed which includes:

- Assessment review of Remuera Road and Khyber Pass bus lanes
- Improvement of Onewa Road T3 lane configuration
- Review and assess the entire Auckland bus and transit lane network

- Develop an on-going monitoring programme for the pro-active assessment of bus and transit lanes
- Trial the proposed signage and road markings at four sites
- Implement changes at Grafton Bridge

This will be implemented by the end of June 2012 within allocated budget for this financial year. The roll-out and upgrade of signs and markings on all existing bus and transit lanes in 2012 and 2013 will be subject to funding, however this could be accelerated should there be more budget allocated to the action plan.

Report

Refer to Attachment 1 for the full report.

Next Steps / Key Issues

Implement the Action Plan included in the report and outlined in the Executive Summary above.

The roll-out and upgrade of signs and markings on all existing bus and transit lanes in 2012 and 2013 will be subject to funding, however this could be accelerated should there be more budget allocated to the action plan.

Recommendation

It is recommended that:

i) That the policy generated in this report is endorsed by the Board.

ii) That the Board approve the Action Plan being rolled-out beyond June 2012 with regards to upgrading existing bus and transit lanes across the Auckland region, subject to funding.

Attachment

Attachment 1 – Bus and Transit Lanes Review – Full Report

WRITTEN BY	Miguel Menezes **Senior Network Performance Engineer**	
RECOMMENDED by	Andrew Allen **Manager Road Corridor Operations** Fergus Gammie **Chief Operating Officer**	
APPROVED FOR SUBMISSION by	David Warburton **Chief Executive**	

BUS AND TRANSIT LANES REVIEW

PLANNING AND IMPLEMENTATION MODEL FOR AUCKLAND

July 2011

Auckland Transport
Road Corridor Operations

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Executive Summary

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Bus and transit lanes have been introduced in Auckland in recent years, following the example of many cities across the world. In Auckland, the introduction of these lanes have been largely initiated at a strategic level and related to regional planning strategies. In each instance, designs were implemented from a local perspective, resulting in bus and transit lanes across the Auckland region appearing different from one previous council area to another. This has partially compromised the use of bus and transit lanes in terms of usability, driver recognition and compliance. The latter has made enforcement challenging and contentious with the driving public. A consistent and clear approach to demarcating these lanes is therefore critical in minimising inadvertant infringement of these lanes.

The purpose of this study is two-fold:

- To put forward 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;

- To arrive at standard templates for bus and transit lanes, generic to all locations, to be used for bus and transit lanes: BUS ONLY, BUS LANE, T2 and T3 transit lanes, across the region.

This document also looks to provide clarity around the need for and use of bus and transit lanes, and in doing so sets out to show:

- 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.

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 mean an effective and efficient public transport (PT) system that is able to accommodate the future travel demands of a growing city.
Future growth is inevitable, and looking ahead 40-50 years, Auckland's population will be at least 2 million people. To effectively accommodate this growth, the transport system will require a PT network that can carry at least 200 million passenger trips annually between regional centres across Auckland, at high frequencies with reliable travel times.
To achieve these objectives, PT patronage needs to increase substantially, with a resultant need to expand the PT system, including providing greater ease of travel for PT on several key arterials. 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.
It is in this context that bus and transit lanes are both beneficial and necessary.

The policy put forward in this document provides some transparency and guidance to the implementation of appropriate bus and 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.

In this regard, the assessment of the following five routes suggests the following outcomes:

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- Remuera Road : retain the current bus lane configuration, and undertake further monitoring to confirm the current assessment.
- Tamaki Drive : retain the T2 lane configuration still under trial.

With regards to the physical appearance of bus and transit lanes, an extensive review of current practice abroad has informed improvements to be introduced to the current Auckland experience. A recent change in the Traffic Control Devices (TCD) Rule by NZTA has also 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. The change will result in the reduction of signage necessary along the route, and in turn facilitates clarity to road users.

Moving forward, a series of templates have been devised to cover the signage and markings of bus lanes and transit lanes, providing standardised treatments for the region, and which also addresses current and historical confusion related to the appearance of these lanes.

The templates concentrate on simplifying and clarifying line marking and signage associated with these lanes. Of particular significance is the recommendation to use a solid green and white line demarcating the bus or transit lane, as opposed to the single white line currently being used. A second key element is the use of a 50m indicator arrow, and broken lines to better reflect where drivers may cross into the bus or transit lane in order to turn off the route.

It is anticipated that inadvertent infringement of bus and transit lanes will be significantly minimised through these measures. These are to be trialled and if assessed to be beneficial, implementation of these elements are to be rolled out across the region going forward, and applied to any upcoming implementations. This forms part of an action plan expected to run for the next three years, to bring all bus and transit lanes up to a clearer and uniform standard.

Communication and educational campaigns are to play key roles going forward, and enforcement remains necessary and will include monitoring of the lanes to inform how well the signage and line markings are being understood by the driving public.

The development of uniform principals for assessment and implementation of bus and transit lanes now allows Auckland Transport to work toward achieving consistency and clarity across the region. An action plan for the 2011/2012 financial year is proposed which includes:

- Assessment review of Remuera Road and Khyber Pass bus lanes
- Improvement of Onewa Road T3 lane configuration
- Review and assess the entire Auckland bus and transit lane network
- Develop an on-going monitoring programme for the pro-active assessment of bus and transit lanes
- Trial the proposed signage and road markings at four sites
- Implement changes at Grafton Bridge

This will be implemented by end of June 2012 within allocated budget for this financial year. The roll-out and upgrade of signs and markings on all existing bus and transit lanes in 2012 and 2013 will be subject to funding, however this could be accelerated should there be more budget allocated to the action plan.

1. Introduction

Bus and transit transit lanes have been introduced in Auckland in recent years, following the example of many cities across the world. With respect to Auckland, the introduction of these lanes have been influenced at a strategic level by the previous Auckland Regional Transport Authority (ARTA) based on regional planning strategies. These lanes however, were implemented by the various local councils and involved a variety of individual consultants for the design of special vehicle lanes projects across the Auckland region. In each instance, the treatments developed have been primarily dependent on the individual interpretation of the Traffic Control Devices (TCD) Rule based on what is considered compliant with the Rule.

Designs were therefore implemented from a local perspective and without recognizing the varying TCD Rule interpretations across the region, resulting in designs rarely aligning to a common standard. Whilst compliance of the designs were undertaken, these were generally based on enforceability and did not necessarily address the varying details and appearance.

Hence, bus and transit lanes across the Auckland region can and do appear different from one previous council area to another, thereby also compromising the use of bus and transit lanes in terms of usability, driver recognition and compliance.

Furthermore, enforcement is hampered and frequently contested by motorists. A consistent and clear approach to demarcating these lanes is therefore critical in minimising inadvertant infringement of bus and transit lanes.

The purpose of this study is two-fold:

- To put forward a policy that aligns with strategic planning objectives and provides an analytical basis and assessment, for the implementation of bus and transit lanes for the Auckland region;

- To arrive at a guide to standard templates for bus and transit lanes, generic to all types of locations, to be used by Auckland Transport and consultants to undertake project designs involving bus and transit lanes: BUS ONLY, BUS LANE, T2 and T3 transit lanes.

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.

It is recommended that all designs are reviewed by a small experienced group of Auckland Transport officers to ensure that each design for each location fits as close as is practical to these templates. In this way, it is highly likely that close uniformity of treatment and appearance will be attained, that will not only enable enforcement, but more importantly will promote increased understanding, usability, driver recognition and therefore general acceptance and compliance by the driving public.

This document looks to provide clarity around the need for and use of bus and transit lanes, and in doing so sets out to show:

- 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.

2. POLICY

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 will comprise 40% of NZ's population by 2041. Auckland currently generates 37% of national GDP and therefore plays an important economic role for the nation.

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.

Examples of cities similar to Auckland in nature making successful improvements to PT networks are Brisbane and Perth in Australia, Ottawa and Vancouver in Canada, and Portland in the USA.

Key factors to the success of these cities include having:

- a strong institutional/government support for integrated land use and PT planning
- a layered arrangement of PT services, involving:
  - a Regional Transit Network (RTN) backbone,
  - a Quality Transit Network (QTN),
  - a Local Connector Network (LCN) of supporting services / feeders combining to provide good geographical coverage
- targeted services to appropriately accommodate key demand areas
- high frequency and reliable PT services
- investment in PT infrastructure and stations

In terms of quality of life, Auckland consistently ranks in the top 10 with other Organisation for Economic Co-operation and Development (OCED) cities such as Vancouver. However, it is pertinent to note that in respect of infrastructure provision, while Vancouver ranks 5th, Auckland ranks in the bottom group at 46th.

Maintaining and advancing Auckland's position as New Zealand's major commercial and population centre is vital to the country's long-term future. Therefore, for the successful future of both Auckland and New Zealand there is a need for a deliberate and planned approach regarding the transport system.

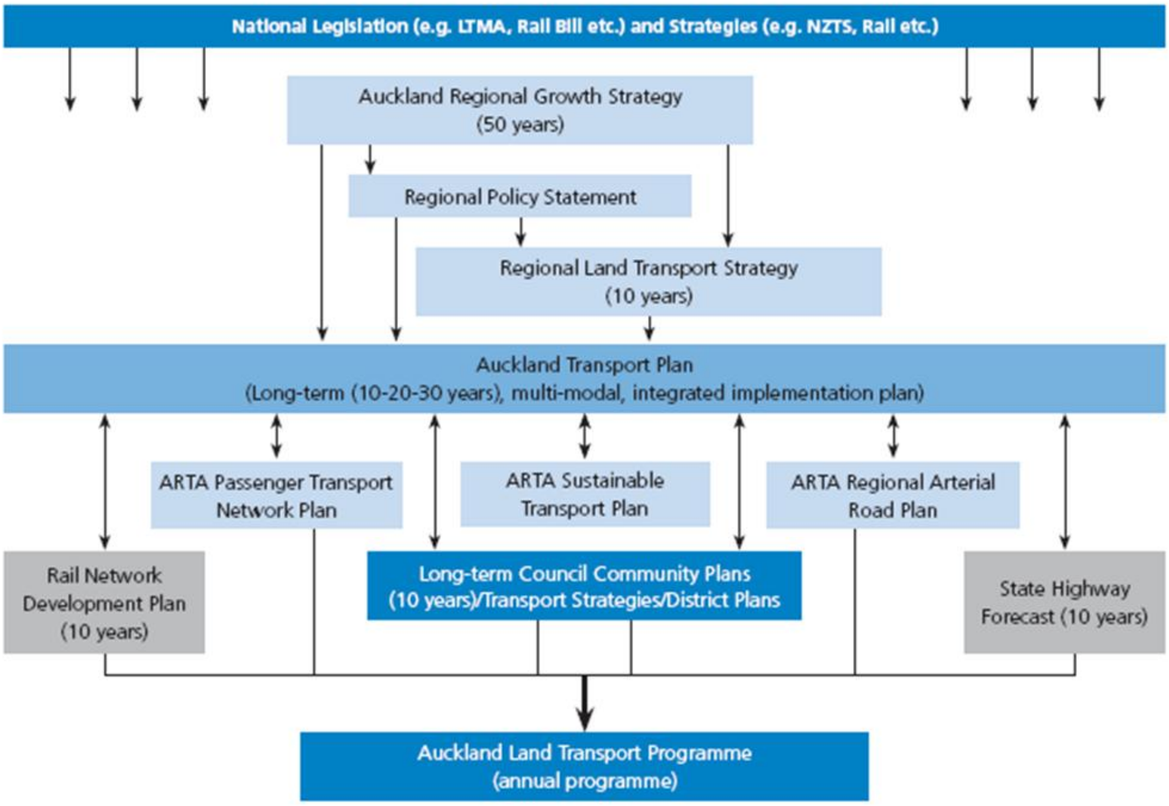
Under National Legislation and Strategies, Auckland is required to develop several policy and planning documents, setting the vision and plan forward to enable the city's success. These policy and planning documents were historically developed by Auckland Regional Transport Authority (ARTA), together with the Auckland Regional Council (ARC) prior to the recent formation of Auckland Transport and Auckland Council. Key documents include the following:

- The Regional Growth Strategy (RGS)
- The Regional Policy Statement
- The Regional Land Transport Strategy (RLTS) which is a 10 year strategy

- The Auckland Transport Plan (ATP) that plans for a 10, 20 and 30 year horizon
- The Regional Arterial Road Plan (RARP)
- The Passenger Transport Network Plan (2006-2016) - PTNP
- From which the Long-term Council Community Plans LTCCP and Auckland Land Transport Programme and annual programme is developed.

These are shown in context in the figure below, extracted from the PTNP document. Note that the figure is historic and the documents listed are currently in the process of being reviewed and updated to represent Auckland Council and Auckland Transport strategies.

Figure 2.2: Auckland Regional Transport – Policy and Planning Documents



In particular, the RTLS strategy is to further develop and expand Auckland's RTN and QTN networks, acknowledging that investment in PT and these networks better supports economic growth and productivity than road investment alone.

In terms of the regions road network, there is a requirement to manage the network to give effect to the strategic and regional arterial road hierarchy. Related to this is the need to manage road space to prioritise the movement of people, goods and services using sustainable transport modes. Guidelines regarding appropriate emphasis of routes, whether for PT, freight, general vehicle movement, or community emphasis have therefore been developed and reflected in the RARP and related documents such as Liveable Arterials developed by Auckland City Council.

Looking ahead 40-50 years, Auckland's population will be at least 2 million people, and the 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.

To achieve these objectives, PT patronage is expected, and required, to increase substantially, with a resultant need to expand the RTN and provide greater ease of travel for PT on several key arterials forming the QTN. By having regional routes comprising only general vehicle lanes, means that the capacity 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.

Coupled with greater ease of travel for these modes introduced by 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.

2.2 Auckland's Plan – WHERE?

In working towards providing an efficient transport system, Auckland has the potential for a world-class PT system, if further developed and supported. Auckland currently has a form of layered PT network with:

- a RTN, which consists of the rail network and the Northern Busway,
- a QTN comprising extensive bus and ferry networks, and
- LCN, primarily formed by local bus networks.

The current PTNP provides a gap analysis based on future traffic modelling, and shows that with further and deliberate development of the PT system, the future growth anticipated in Auckland can be successfully and appropriately accommodated. The modelling also assists in identifying potential PT-emphasis links that are required on the road network, which form the longer-term QTN.

In broad terms, the following routes form Auckland's network of PT-emphasis routes forming the QTN, as currently defined by the RARP and the PTNP:

- Northern sub region:
    - Albany-Takapuna
    - Albany-Westgate
    - Albany-Glenfield-Highbury
    - Browns Bay-Constellation Drive
    - Brown's Bay-Takapuna

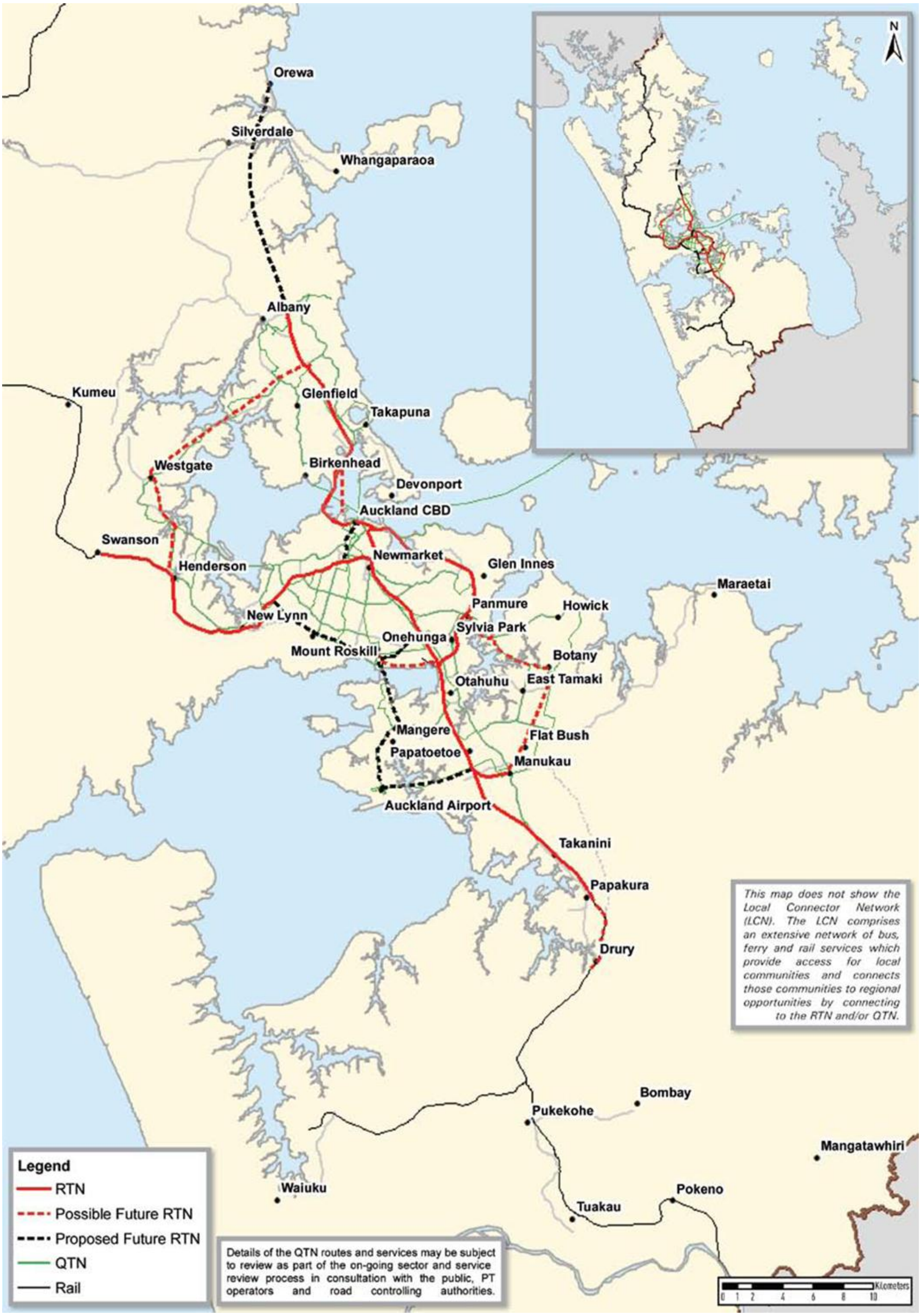
- Western sub region:
    - Westgate – Auckland CBD
    - Westgate – Henderson and New Lynn
    - New Lynn – Auckland CBD
    - New Lynn – Onehunga - Panmure
    - Henderson – Auckland CBD

- Central sub region:
  - Central Connector: Newmarket – Auckland CBD
  - Fanshawe Street, primarily providing continuity for the Northern Busway
  - Dominion Road – Auckland CBD
  - Mt Eden Road – Auckland CBD
  - Onehunga – Newmarket – Auckland CBD
  - Airport (via Dominion Road) – Auckland CBD
  - Onehunga – Otahuhu
  - Panmure (via Great South Road) – Newmarket and Auckland CBD
  - Panmure (via Mt Wellington Quarry and Remuera Road) – Newmarket and Auckland CBD

- Southern sub region:
  - Airport – Manukau
  - Airport – Otahuhu and Panmure
  - Manukau – Otahuhu and Panmure
  - Botany/Howick – Newmarket and Auckland CBD

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

The RTN and QTN routes are reflected in the following figure, extracted from the RARP.


Orewa
Silverdale
Whangaparaoa
Albany
Kumeu
Glenfield
Takapuna
Westgate
Birkenhead
Devonport
Auckland CBD
Swanson
Newmarket
Glen Innes
Henderson
Maraetai
Panmure
Howick
New Lynn
Sylvia Park
Onehunga
Mount Roskill
Botany
Otahuhu
East Tamaki
Mangere
Flat Bush
Papatoetoe
Manukau
Auckland Airport
Takanini
Papakura
Drury
Bombay
Pukekohe
Mangatawhiri
Waiuku
Pokeno
Tuakau
This map does not show the Local Connector Network (LCN). The LCN comprises an extensive network of bus, ferry and rail services which provide access for local communities and connects those communities to regional opportunities by connecting to the RTN and/or QTN.
Legend
RTN
Possible Future RTN
Proposed Future RTN
QTN
Rail
Details of the QTN routes and services may be subject to review as part of the on-going sector and service review process in consultation with the public, PT operators and road controlling authorities.
Kilometers
0 1 2 4 6 8 10
N

At this stage, not all regional routes are expected to include bus lanes. This is related to the priorities assigned by RARP, which aims to establish an effective transport system for Auckland, encompassing not only the PT network but also freight, general vehicle movements and community-emphasis or pedestrian amenity. However, in the longer term, a significant number of regional arterials are likely to have bus lanes, given the high people carrying capacity of these lanes.

2.1 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 recommended 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 variations in traffic patterns and composition that are induced with the implementation of bus or transit lanes.

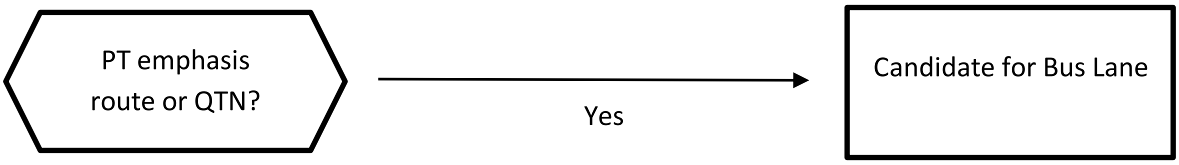
Firstly, a shift in modal split generally that takes place, however the extent thereof varies depending on specific characteristics of the affected traffic and the particular network. Secondly, there is commonly a shift in travel patterns, resulting in additional traffic being attracted and/or diverted 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 regarding the extent of modal shift and induced traffic related to the implementation of an alternative bus or transit lane configuration, will be necessary.

Notwithstanding the above, the following assessment criteria are recommended, and the assessment process facilitated by means of applying the decision flow diagram that follows.

2.1.1 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 current RARP, PTNP, and other strategic objectives.

This effectively implies that corridors identified as part of the QTN are likely to have bus lanes at some point. The timing thereof will be dependent on the analytical assessment criteria 1, 2 and 3 below.



2.1.2 Consideration of Specific Characteristics of the Route

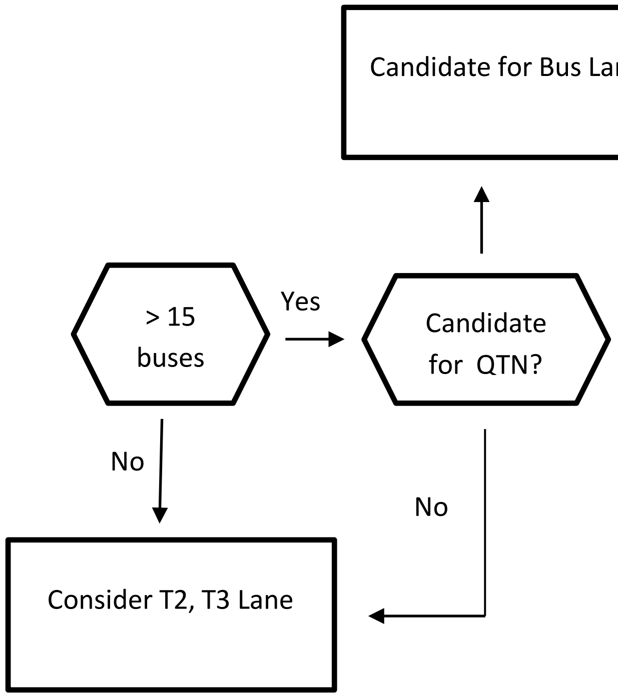
Each route should be individually assessed, with regards to timing and appropriateness. A key consideration in this respect is the current and planned number of buses on the route. The RARP suggests that where there are 15 or more buses per hour on a route, 'special treatment' for buses on this route should be considered, and thereby can form a means of identifying a route with potential PT emphasis or QTN status.

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

Other aspects that are considerations include the following:

a	Passenger catchment – conducive for PT
b	Freight emphasis route
c	Vehicle emphasis route

a. Some routes are more conducive than others for bus lanes or bus priority, for example:
   i. if the route provides a strong connection between key destinations in terms of movement of people
   ii. if there are no alternative means of public transport along the wider corridor of this route
   iii. if the route is through, or in close proximity to, significant passenger catchments, 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.
b. 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 1, 2 and 3 below.
c. For these routes, increased efficiency/productivity can be achieved through the use of a T2 or T3 lane, as appropriate, subject to the assessment criteria 3, 4 and 5.



2.1.3 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:

LOS 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.

LOS 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.

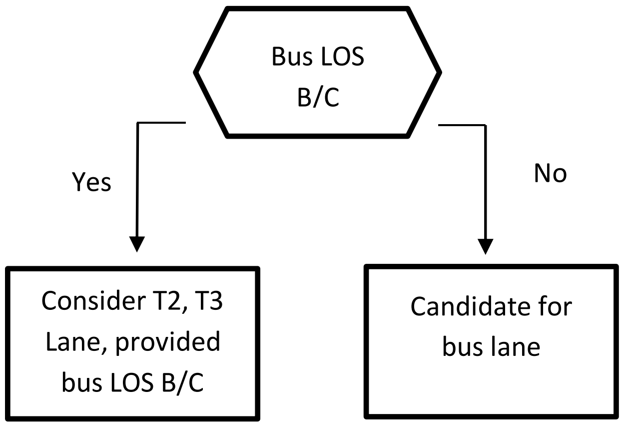
LOS C: stable operating conditions but with manoeuvring becoming more restricted and motorists experience some driver discomfort and delays. Average travel speeds are at about 50% of the sign-posted speed limit.

LOS 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.

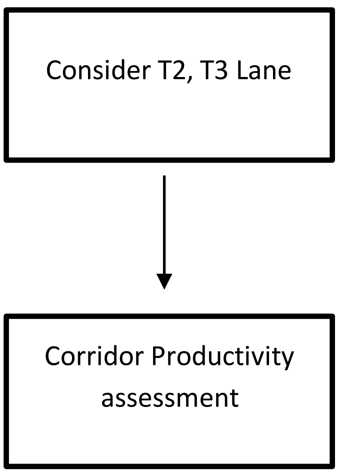
LOS E: conditions are unstable and characterised by queuing and significant delays with average travel speeds reduced to about 33% of the sign-posted speed limited or lower. Manoeuvring is very restricted. Stop-go conditions are typical.

LOS F: conditions are characterised by excessive congestion and delays with average travel speeds of 25% of the sign-posted sped limit and below.

Based on earlier work undertaken by Auckland City Council, around the development of an overall network performance framework, it is desirable to enable a LOS of B or C for buses on QTN routes. This LOS depicts acceptable conditions with only moderate delays, which depicts relatively favourable conditions during peak periods. Consequently, if buses experience a poor LOS on a QTN route, bus lanes may be necessary to improve the LOS for PT movement on this route. Alternatively, should buses currently experience a favourable LOS there may be no need to introduce bus lanes at this stage. At this stage, increased efficiency for the route through the implementation of a T2 or T3 transit lane, may be an option and can 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. Again this is based on the resultant excessive delays, and therefore loss in efficiency that would be associated with a LOS E and F. Where a LOS C or D (or better) is not the case, there may be scope to increase corridor efficiency/productivity through the use of a managed traffic lane.



2.1.4 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 figure 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 figure.

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. 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 this benchmark. To achieve the same productivity without the bus lane, there would effectively need to be two additional general lanes added.

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

Determining likely travel speeds of traffic streams under alternative lane configurations remains an important variable to understand, as well as understanding the likely changes to traffic composition under the alternative lane configurations. An example is the current trial with changing the bus lane on Tamaki Drive to a T2 lane, which resulted in a 5 to 10% increase in T2 traffic, with a similar reduction in single occupancy vehicle traffic, indicating an attraction of additional T2 vehicles from adjacent routes of the network.

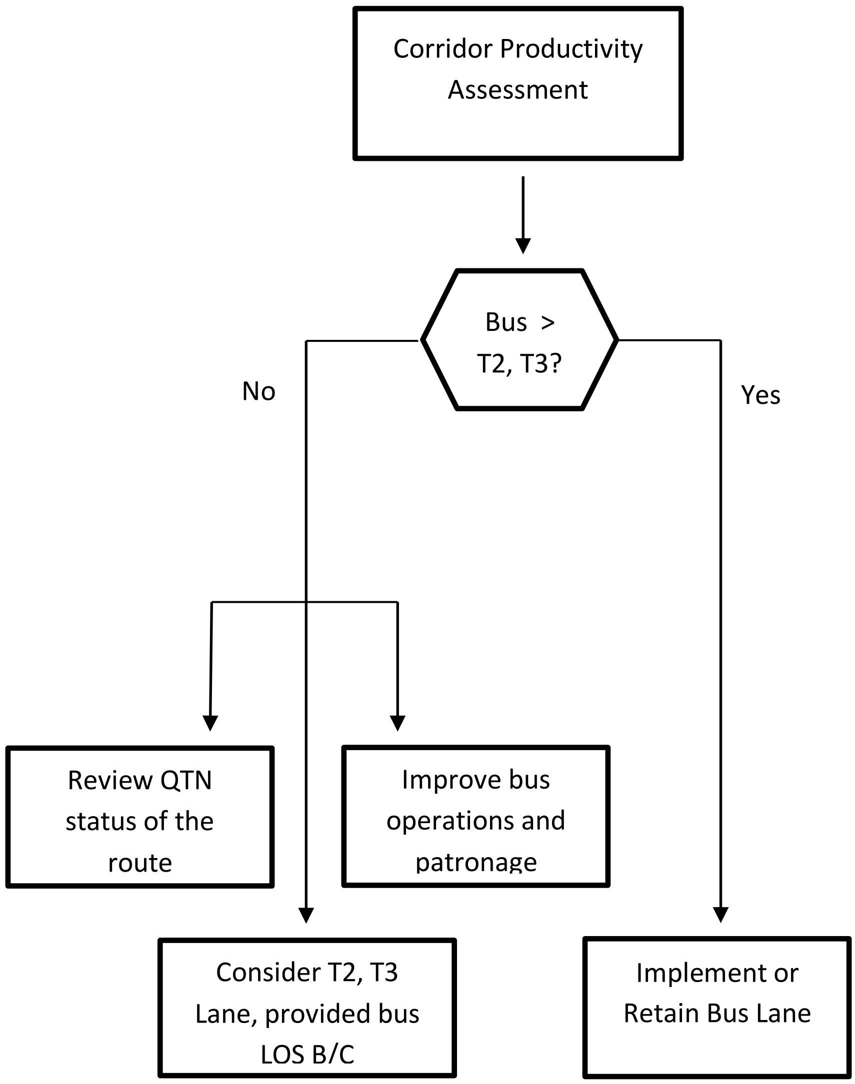
With respect to travel speeds, an assumption can be made based on documented Speed-Flow curves, although these vary based on specific conditions and characteristics of the route ranging from lane widths, road-side friction, road geometry, road environment, traffic signal density and traffic flow conditions of adjacent lanes. In general terms, travel speeds decrease with increased number of vehicles in the lane, increasingly so as volumes increase beyond 400 vehicles per lane. By way of example, the following table is an approximate representation of this relationship for a section of road with multiple traffic signals and speed limit environment of 50km/h.

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 QTN routes, is the comparison 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 good 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.

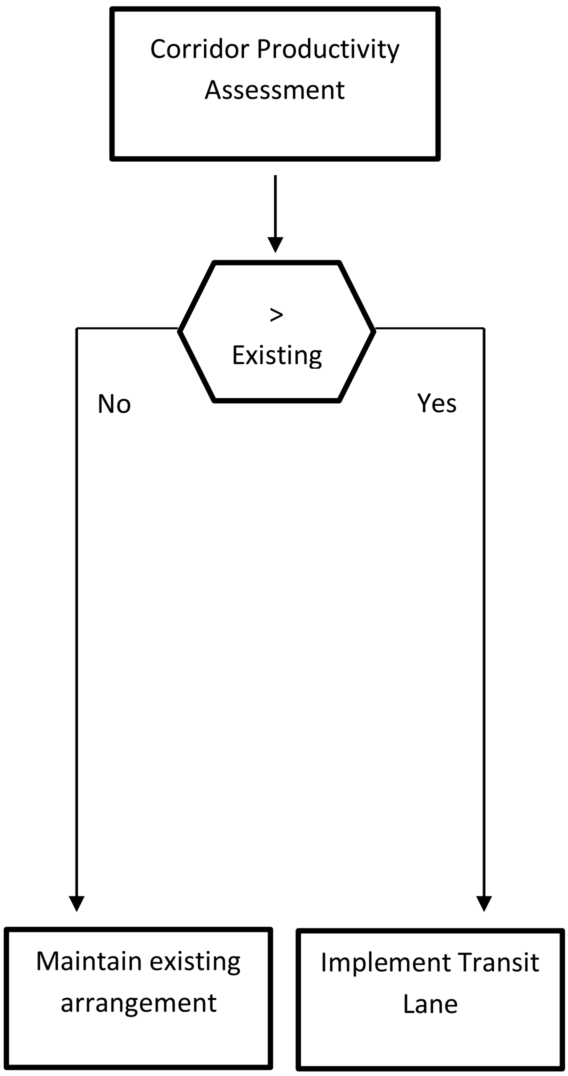
In this case, three options are available:

- look at ways of improving bus operations or patronage – so that it operates as an efficient PT emphasis route,
- review the QTN 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 QTN routes, which is to provide relative ease of travel for PT on these routes.



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 10% or more relative to the benchmark.

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.



2.1.5 Analytical Assessment 3: Person Trips

Person trips by lane would be a third analytical consideration, although perhaps of lower significance to the corridor productivity analysis above. As such, it is recommended this assessment be applied as a confirmation of the foregoing assessment.

This measure does however provide an easily understood assessment for the implementation of alternative bus or transit lane configurations. Effectively, 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% (or more) of the total person trips on the bus / transit lane, is favourable and will begin to exhibit increased corridor productivity and efficiency.

2.1.6 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.

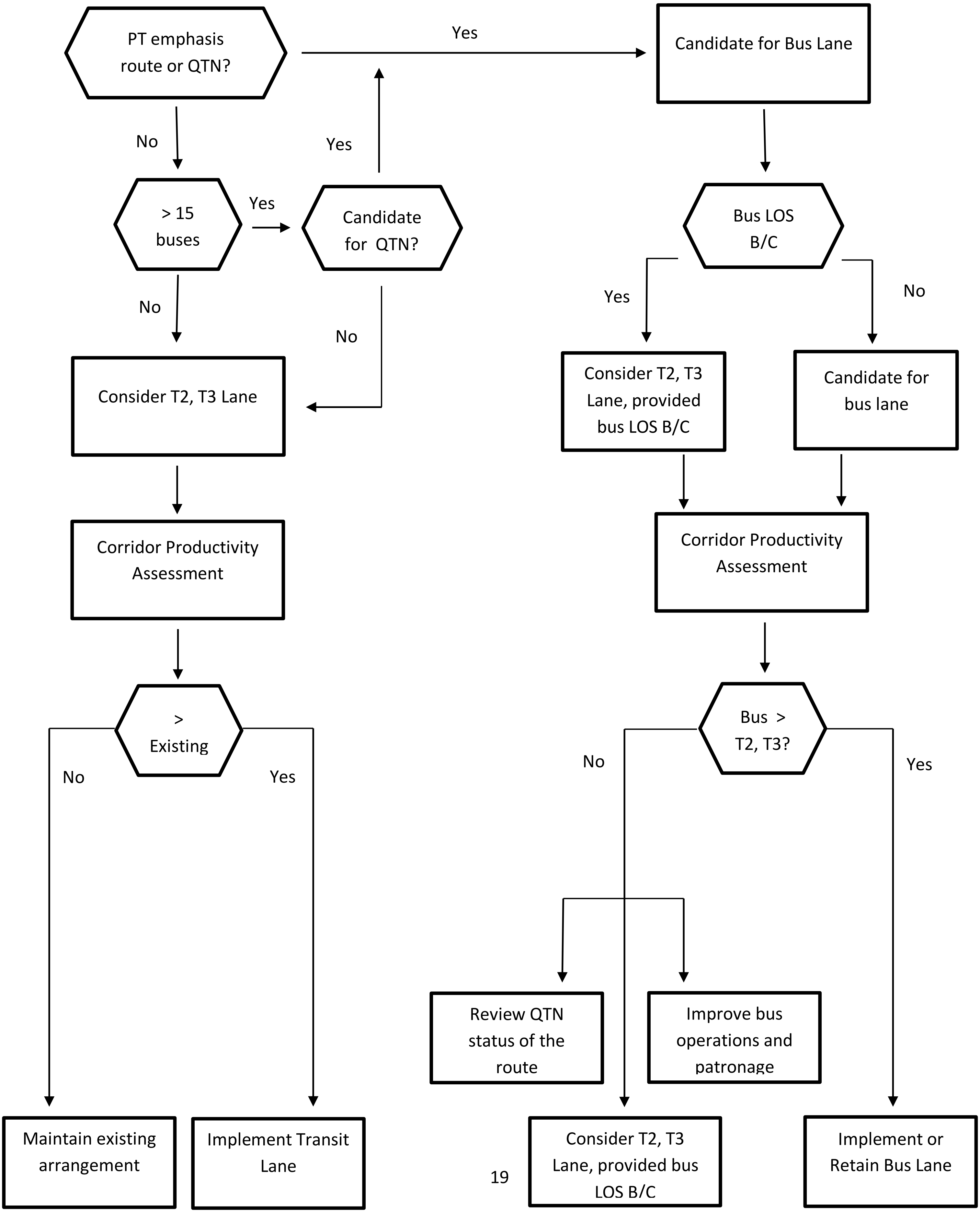
With bus and transit lanes currently forming a significant element to the cycle network across the region, it is important to implement appropriate lane widths to these lanes going forward. AUSTROADS recommends an ideal lane width of 4.5m, with an absolute minimum of 4.2m. It is recommended that all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

The above assessment criteria is able to 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

Final Template



It is proposed that this template be applied generically for key routes across the region, assessing various bus and transit lane scenarios, as necessary. This is included in the Action Plan in section 6.

Application of the decision flow diagram to the following routes has been undertaken, and is included in Appendix B. Suggested outcomes for the respective routes are as follows:

- **Dominion Road**: retain the current bus lane configuration.
  Points to note:
  - Buses carry more people than cars during the morning peak hour (53% of the total).
  - There are 34 buses during this period.
  - Traffic conditions are relatively poor for both bus and general lane traffic. Improving travel times will significantly increase productivity, due to the high number of buses.

- **Fanshawe Street**: retain the current bus lane configuration.
  Points to note:
  - Buses carry significantly more people than cars during the peak hours (72 to 78% of the total).
  - There are 102 buses on the bus lane in the morning peak hour.
  - Corridor productivity is close to double the benchmark value.
  - Traffic conditions are relatively poor for both bus and general lane traffic. . As above, improving travel times will significantly increase productivity.

- **Onewa Road**: retain the current T3 lane configuration.
  Points to note:
  - The T3 lane carries more people than the genral lane, as much as 83% west of Lake Road.
  - As a T2 lane, there would be more traffic on the T2 lane than on the general lane, west of Lake Road.
  - Productivity is higher for the current T3remains as opposed to a T2 lane.
  - Partial continuity of the T3 lane onto the SH1 southbound on-ramp will enhance productivity.

- **Remuera Road**: retain the current bus lane configuration, explore opportunities to enhance bus patronage, and undertake further monitoring to confirm the assessment.
  Points to note:
  - Buses carry a third of the people travelling on the route in the morning peak hour.
  - Bus occupancies are relatively low, and restrict productivity outcomes.
  - Buses operate at a lower LOS compared to general traffic, due to lost time at bus stops.
  - Productivity is similar (1% higher) to that of a T3 lane arrangement, and higher compared to a T2 lane arrangement or two general lanes arrangement.
  - Additional monitoring and assessment is recommended to confirm that the assessment is representative.

- **Tamaki Drive**: retain the T2 lane configuration still under trial.
  Points to note:
  - Buses carry 16% of the person trips during the morning peak hour.
  - As a T2 lane, more than half the people travel on this lane.
  - Productivity is highest as a T2 lane arrangement.

It should be noted that these assessments have been undertaken based on a single set of survey data. 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, it is important to apply the assessment in a robust manner, to maintain a relative consistent approach to operating the road network.

2.4 General Considerations

2.4.1 Implementation Strategy of Bus and Transit Lanes

Generally progressive staging form general lanes, to T2, to T3 configuration, to bus lane can take place in time, and subject to the particular characteristics of the route. This progression will be primarily influenced from an operational basis, in delivering 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 QTN routes. In principle, should buses be travelling with relative ease on a PT emphasis or QTN 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 QTN routes.

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 the downstream treatments, and ideally ensure that vehicles on transit lanes are able to disperse or merge into the general traffic with little hindrance or friction, to retain network improvements introduced by the bus or transit lane arrangement.

Accordingly:

- 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. In this regard, the termination of the T3 lane on Onewa Road should ideally take place within the southbound onramp, as opposed to prior the onramp. This is recommended, and will require discussion and agreement with NZTA in delivering effective one network operational benefits.

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 9 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.

2.4.4 Use of Bus and Transit Lanes by Mobility-Impaired Travellers

Mobility taxis are generally classified as 9-seater or more, and if registered as a bus, would therefore 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.

2.4.5 Treatment of bus lanes through town centres

Bus lanes should generally be retained through town centres, except where there are a series of intersections resulting in a complexity of vehicular movements across the bus or transit lanes, in which case clearways would be most 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.

3 IMPLEMENTATION – 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 and adhered to by motorists.

These lanes were previously implemented by the various local councils and involved a variety of individual consultants for the design of special vehicle lanes projects across the Auckland region. In each instance, the treatments developed have been primarily dependent on the individual interpretation of the Traffic Control Devices (TCD) Rule based on what is considered compliant with the Rule. Designs were therefore implemented from a local perspective and without recognizing the varying TCD Rule interpretations across the region, resulting in designs rarely aligning to a common standard. Whilst compliance of the designs were undertaken, these were generally based on enforceability and did not necessarily address the varying details and appearance.

Hence, special vehicle lanes across the Auckland region currently can and do appear different from one previous council area to another, thereby also compromising the use of bus and transit lanes in terms of usability, driver recognition and compliance.

As a result, an extensive review of current practises abroad of both good and poor examples was undertaken in order to assess what improvements can be introduced to the current Auckland experience. Some learnings form current practice in London and Sydney were adopted in the development of proposed templates for Auckland. In particular, the treatment of the '50 metre mark' used in London has been adopted in the proposed templates.

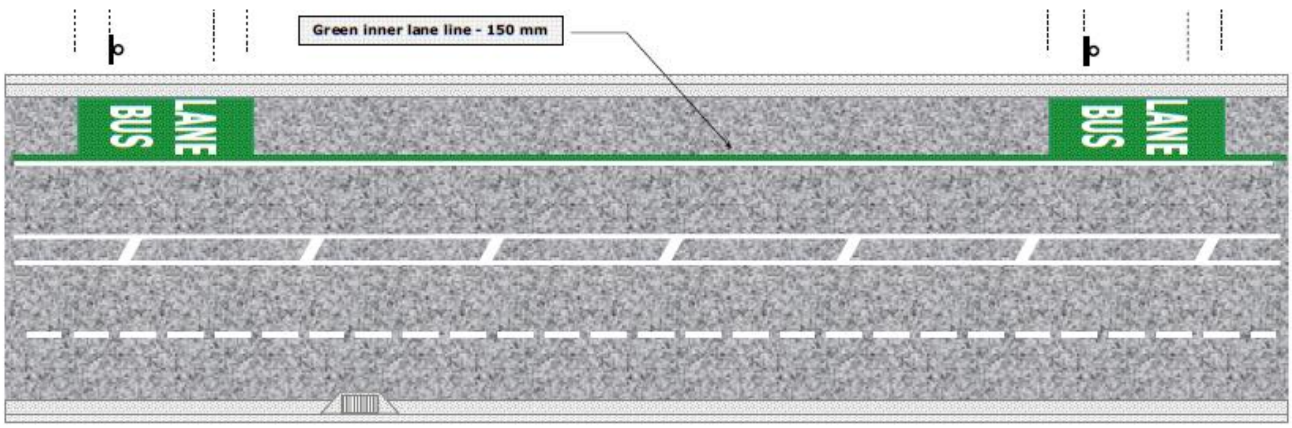
A recent change in the Traffic Control Devices (TCD) Rule by NZTA in April 2011, enabled the designation of bus (and transit) lanes from the beginning of a corridor to the end, without the need to break up the routes into multiple segments at intersections along the way, to enable the movement of vehicles 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.

3.1 Clear Demarcation of Lanes - Signage and markings

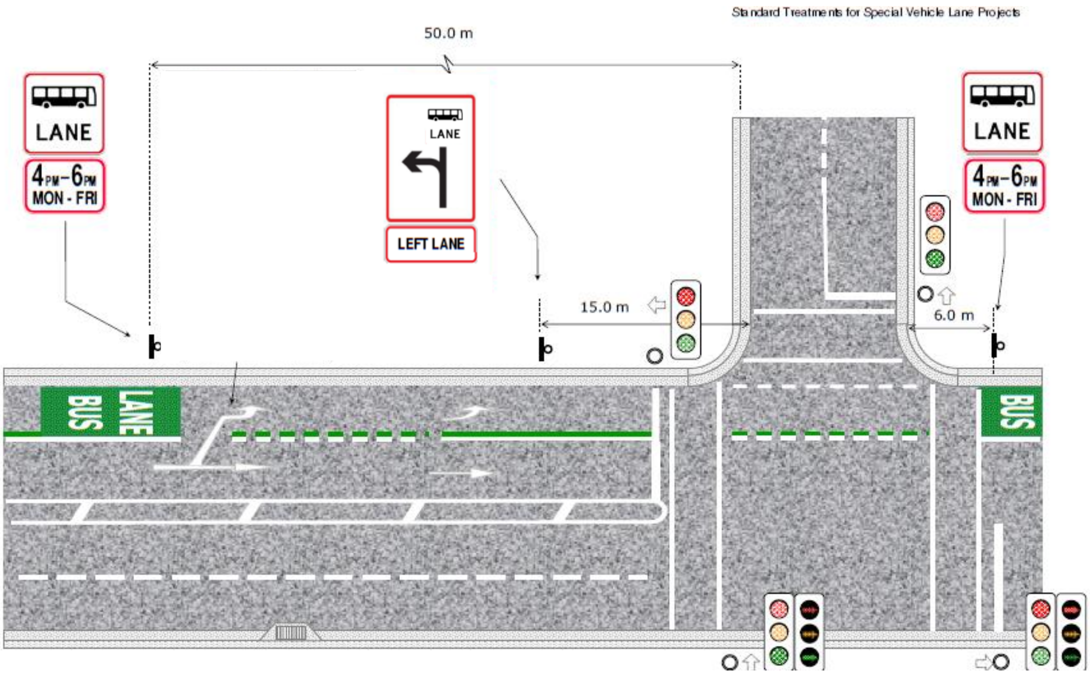
As a result, a series of templates have been devised to cover the signage and markings of bus lanes and transit lanes, providing standardised treatments for the region, and which also addresses current and historical confusion related to the appearance of these lanes. The templates cover the start of the bus lane, treatment at intersections with a proposed 50m indicator arrow and marking, signalised intersection treatments, and ending the bus lane. These are included in Appendix C.

The templates concentrate on simplifying line marking and signage, and include three key elements aimed at significantly clarifying the use of the bus or transit lane. These elements are:

1. The use of a solid green line adjacent to the solid white line demarcating the bus or transit lane.

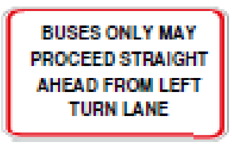


2. The use of a 50m indicator arrow, and broken lines (double green and white line) to reflect where drivers may cross into the bus or transit lane in order to execute a turning manoeuvre. Note that the use of the bus lane by general traffic in this situation is solely for the purposes of executing the 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.

The above is to replace the wordy signage currently used at a variety of locations. An example of which is shown below:



Each of these are to be trialled and if assessed to be beneficial, implementation of these elements can be rolled out across the region going forward, and applied to any new implementations. This is briefly outlined in the Action Plan in section 6 of this report.

The green line element will effectively connect the green panels and potentially better highlight the bus lane, providing a cost-effective alternative to greening the entire lane. See Appendix C Figure 2.1.

The use of a solid green and white line provides additional benefit in providing clarity for motorists on the side road as to which lane is appropriate to enter. In some instances, it can be unclear to a motorist as to which lane to travel when faced with three or four lanes, each demarcated with solid white lines. This is particularly the case for motorists entering such a road from a side road. It is recommended in some instances to further compliment the lane markings with lane arrows to eliminate any confusion where this may exist.

Care is required in the implementation of this widened line to ensure cycle safety is not compromised.

3.2 Alternative treatments

Two alternatives have been proposed for further consideration, if deemed necessary to provide further clarification of bus or transit lanes namely:

1. Use of low-profile LED raised pavement markers (RPMs) along the white (or green and white) line. See Appendix C Figure 2.2. 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.

2. Use of electronic signage or Variable Message Signage (VMS) to compliment standard signage, and illuminated during appropriate operating times.

3.3 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.

It is recommended that variations be limited, and kept consistent along individual routes, and within local areas if possible.

3.4 Special Cases – Grafton Bridge

Signage clutter, vehicular and pedestrian activity, and active frontages in close proximity to the road network all contribute to poor compliance of the Grafton Bridge bus lane, which operates from 7am to 7pm. A further complication is that Grafton Bridge is effectively a bus way (accommodating cycles, mopeds and motorcycles), as opposed to a bus lane that generally runs in parallel with a general lane. As such, there will need to be some signage and markings unique to this site.

It was noted that there is more than sufficient signage in place at this location, and simplification of signage would be beneficial.

Proposed solution will take the following form:

1. Use of electronic restrictive signage (VMS) at the entry points to compliment standard signage and illuminated from 7am to 7pm.
2. Use of larger lane use signage (with a larger red cross) on the overhead gantry in place of the existing 3-aspect lantern, eliminated during the bus operation period.
3. Use of a series of LED RPMs will also be considered.
4. Use of a communication plan
5. Communication with GPS navigational suppliers to update their respective systems to not guide general users via Grafton Bridge during the bus operation period.

The above is subject to the outcomes of further and more detailed investigation.

4. 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 lanes, as well as provide ongoing communication on the topic.

Preceding the bus or transit lane implementation there is advertising campaign mainly via newspaper, however since drivers come from wide catchment area it is very difficult to have targeted advertising.
In terms of education of the general public is concerned, there have been sporadic media campaigns explaining how the bus and transit lanes work, however what is required is a sustained campaign aimed at explaining and reinforcing bus and transit lanes operations to the general public. Bus and transit lanes are not in the Road Code most other traffic control devices are, and are not part of the theory test that new driver takes. The learner driver in Auckland gets no exposure to bus lane until they are on the road.
For the education to work the road layout needs a consistent look and feel, which has been a key objective of this review. However, a driver coming from the North Shore through the city travelling to a work destination in Mt Eden, is met up with segments of 24hr bus lanes, bus lanes with am and pm operating times that differ. This will continue to incur inadvertent infringements, until such time variable bus or transit lane signage is introduced, referred to in 3.2.

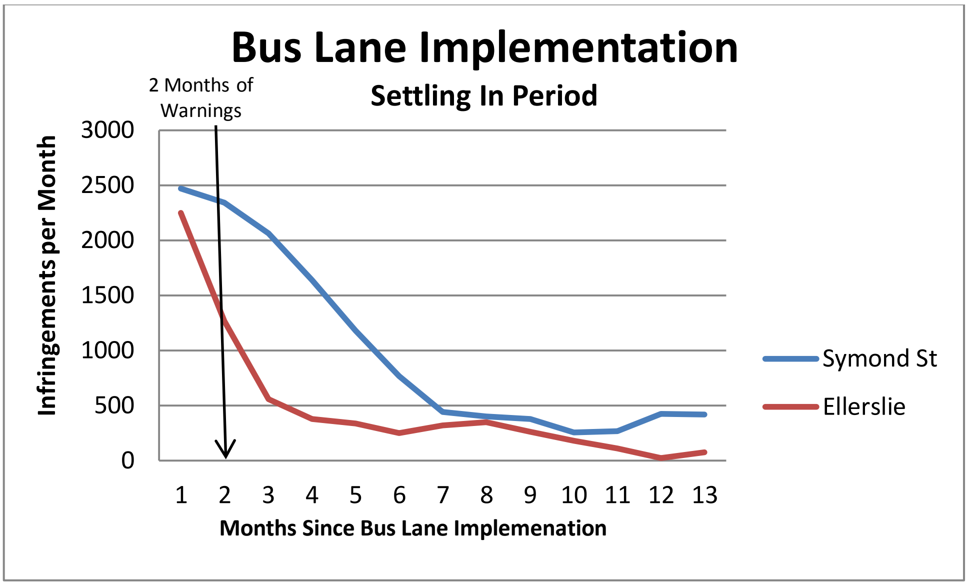
With respect to bus and transit lanes would be communicated through a range of education, promotion and social marketing media. This would include periodic campaigns to key catchment areas and availability of information. Where possible this would be linked to programmes such as car-pooling, personal journey planning, travel planning and public transport promotion. This would include technical information, frequently asked questions and the generation of up to date transit lane map for customers.

5. ENFORCEMENT

Research by Gravitas in 2010 highlighted the need for enforcement to maximise compliance to bus lanes. Improved markings and signage will assist in this regard, however enforcement will continue to be necessary.

In the first two months of the bus or transit lane being in place, motorists using the bus lane are issued with a warning notice and by doing so, hope to educate driver as to the new bus lanes system on that route.

A review of bus lane implementation has found it takes 2-7 months for the majority of driver's on bus lane routes to become familiar with the bus lane layout. The main factors driving that timescale are complexity of the bus lane layout and the frequency of the driver using the route (Opportunity to learn).



The subject of enforcement is very emotive in Auckland, however the reasons for enforcement are outlined in the Gravitas Report (Sept 2010). In Auckland driver compliance is surveyed and is consistently high between 97-98% over the whole Auckland bus lane network. Without enforcement bus lane efficiency will be compromised over time.

The effect of removing enforcement was shown from the recent bus lane monitor Gravitas Report on the Main Highway-Ellerslie bus lane. In the last two previous two surveys March 2009 and March 2010 the Main Highway-Ellerslie bus lane had compliance of 98-99%. In the most recent survey (March 2011) compliance was 66.1% the only change has been the removal of enforcement from Sept 2010. This drop in compliance confirms the research from the Gravitas Report re the vital role enforcement plays in maintaining driver behaviours in bus lanes.

The level of enforcement is set to deter drivers using the bus lanes, getting the correct level of bus lane enforcement of can be difficult. Too little enforcement and the bus lane efficiency is impaired with bus passengers having to put up with longer travel times while too much enforcement lead to adverse reaction from drivers.

The adverse reaction from the general public on bus lane infringements needs perspective. The Symonds Street bus lanes and roads cater for over 559,000 vehicle movements a month on a week day, monitored bus lane compliance from the Gravitas Report (March 2011) for drivers is 90.4%, so 54,000 driver a month do not comply with bus lane by laws. The average monthly bus lane infringements issued for all of

Symonds Street is 351 infringements (Average from Oct 2010- Apr2011), less than 1% of non-complaint drivers get an infringement. The high level of compliance 97-98% and comparatively low infringement issuance rates show the general public do understand how bus lanes operate and show an enforcement regime focussed on changing driver behaviour rather than revenue gathering.

Enforcement levels on bus and transit lanes were initially set so each bus or transit lane would have a regular period of enforcement rolling through each month. The period of enforcement would match the various time restrictions of the bus or transit lane. Over time the enforcement has been adjusted so areas of high compliance have a low level of enforcement almost to a monitor mode, bus lanes evidencing low compliance get increased enforcement till they conform to a minimum 90% plus compliance. Low compliance is based on infringement levels, qualitative evidence from parking officer and bus company complaints.

In all cases the driver can request their case be reviewed citing the extenuating circumstances. The review process takes into account practical issues such as the vehicle, having broken down, been stolen or a medical emergency in all cases some form of verification is required. The other aspects considered as part of a case review are matters of social justice for example attendance at funeral or similar matters. The review process is on a case by case approach, from 1 November 2010 to date around 17,300 bus lane infringements were issued, of which around 4500 were waived. In other words, approximately one in ten bus lane infringements are waived. The most cited reason for wanting the infringement waived is not seeing the signage or confusion about the bus lane layout, which re-emphasises the need for this review.

It is also evident that visitors to Auckland are generally unaware of bus lanes. At the first offence, out-of-towners are issued a warning.

The issue of infringement scales need also be re-visited. Currently, red-light running infringements carry the same $150 penalty as illegal use of a bus or transit lane. Due to the probability of a crash and associated casualties resulting from a red light running offence, it would make better sense to adjust infringement scales to be representative of the severity of infringement, relative to other traffic infringements. This would require working with the courts and legal system to ratify these scales.

Moving forward it is recommended that:

- At the time of the first offence, a warning is issued to the offending driver, and that an education pack on bus lanes is mailed to the driver.
- On the second offence an infringement notice would be issued.
- It is recommended that infringement scales be representative of the severity of infringement, relative to other traffic infringements, and that this be worked through with the courts.
- Warnings will continue to be issued for the first two months of a new bus or transit lane
- Infringement rates are for new implementations are to be monitored, to confirm that infringements drop off as noted above. Should this not be the case after 6 months, a review of the signage and line-markings is to be undertaken, and mitigated accordingly.

6. ACTION PLAN – GOING FORWARD

The development of uniform principals for assessment and implementation of bus and transit lanes now allows Auckland Transport to work toward achieving consistency across the region. The next phase of work should focus on assessing the existing bus and transit lane network against the identified criteria in this report. In conjunction with this all existing signage and road marking should be audited and upgraded to comply with the design standards or templates generated from this report.

The following action plan identifies the key work streams, their associated tasks and time frames for completion.

Project Management

1. Form steering group to oversee implementation of action plan, to include AT: Strategy and Planning, Traffic Operations, Parking and Enforcement, Public Transport Operations (August 2011)

Operational or Policy Review

2. Review the following priority routes:
   - Undertake further detailed monitoring of Remuera Road,
   - Address design elements around the operation of the Onewa Road T3 lane
   - Asses Khyber Pass bus lane against the set criteria (September 2011)
   - Produce report outlining findings and identifying any recommended changes (December 2011)
   - Implement report recommendations (June 2012)

3. Review the entire Auckland bus and transit lane network against set criteria and make initial recommendations (June 2012)

4. Develop an on-going monitoring programme for the assessment of bus and transit lanes. This will provide a proactive approach to operational assessment into the future. The initial goal will be for annual reviews of all bus and transit lanes (initiated July 2012).

Design Review

5. The proposed signage and road markings generated by this report are to be trialled on the following routes:
   - Quay Street,
   - Symonds Street,
   - Fanshaw Street ,
   - Park Road, and
   - Grafton Bridge, as a special case treatment.

   The trial will seek to identify the effectiveness of the design principals outlined in this report, and test 3 sites with the proposed solid green and white line, and look to test a fourth site with the low-profile LED pavement markers. Recommendations will be made for any changes to the design templates before final AT endorsement of the designs (June 2012).

   Grafton Bridge is a special case, and will be addressed accordingly (September 2011).

Tasks associated with the trial will include:

- Consumer-based research and additional external peer review of Design Templates
- NZTA application for trial
- Redesign of above key routes to comply with Design Templates
- Before and After observational study to be undertaken in conjunction with trial
- Implement changes
- Produce report highlighting performance and make recommendations

6. Audit of signs and marking on all existing bus and transit lanes (June 2012)

7. Upgrading existing bus and transit lanes to comply with design templates (June 2013)

8. Roll-out of communication plan during the course of the trial (2011/2012)

9. Roll-out of education campaigns in support of the new signage and road markings, as well as on-going education of the use of bus and transit lanes.

10. Investigate the opportunity to educate motorists on the use of bus lanes by including bus lane elements in the official New Zealand road code.

Aspects of the above action plan pertaining to the 2011/2012 financial year will be implemented by end of June 2012 within allocated budget for this financial year. The roll-out and upgrade of signs and markings on all existing bus and transit lanes in 2012 and 2013 will be subject to funding. The action plan could be accelerated should there be more budget allocated to the plan.

APPENDICES

1. 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
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

North

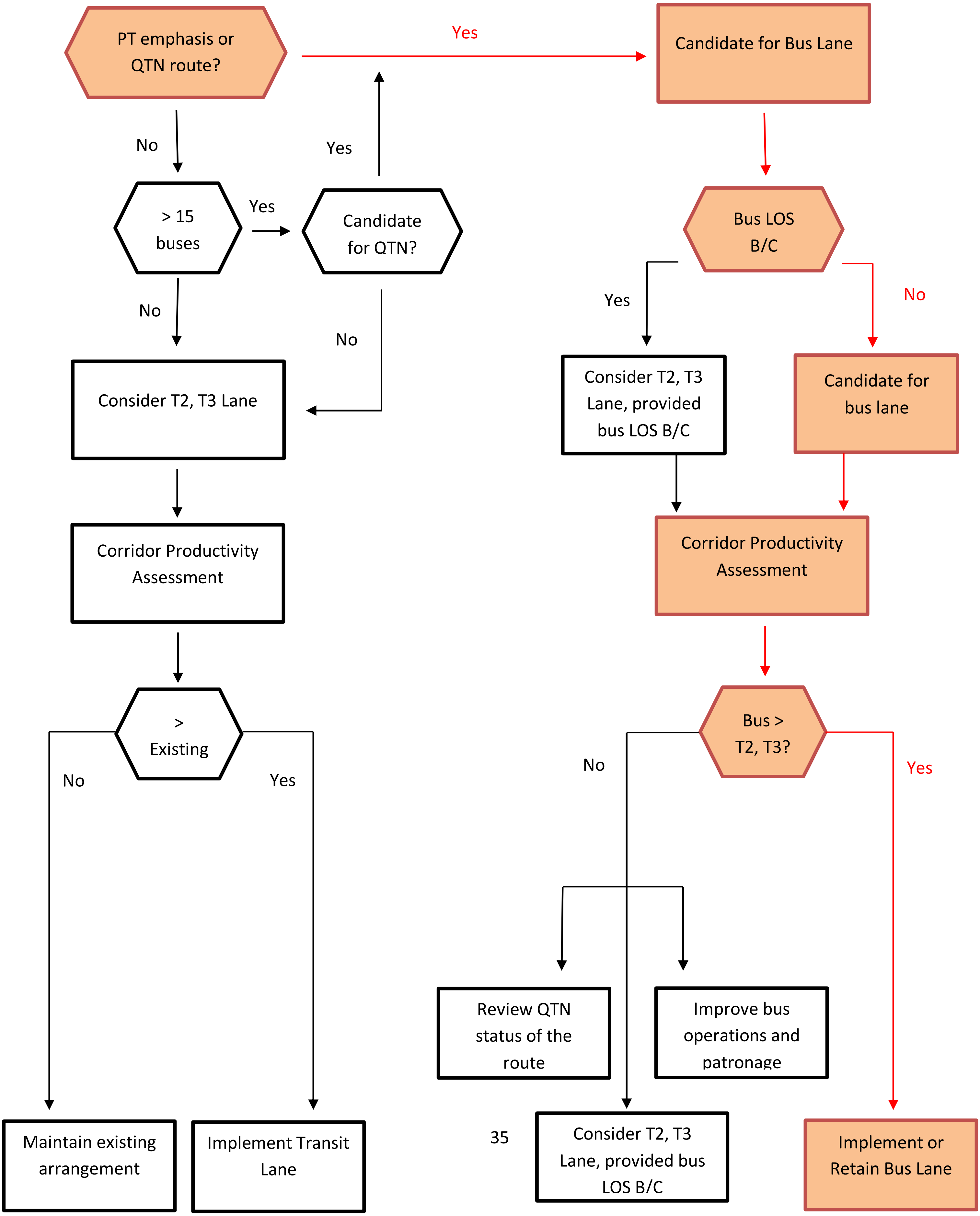
Northern Busway			
Busway (parallel to SH1)	Southbound	Esmonde Road	Onewa Road Interchange
Busway (parallel to SH1)	Both direcion	Constellation Drive	Esmonde Road
Bus Lane			
Road	Direction	From	To
Esmonde Road	Westbound	Eldon Avenue	Connects to sothbound busway
Fred Thomas Drive	Southbound	Anzac Street	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 Cresent
Shakespeare Road	Westbound	East Coast Road	Hospital Road
T2 Transit Lane (PM Peak)			
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	

West

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		

2. Assessment Criteria
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

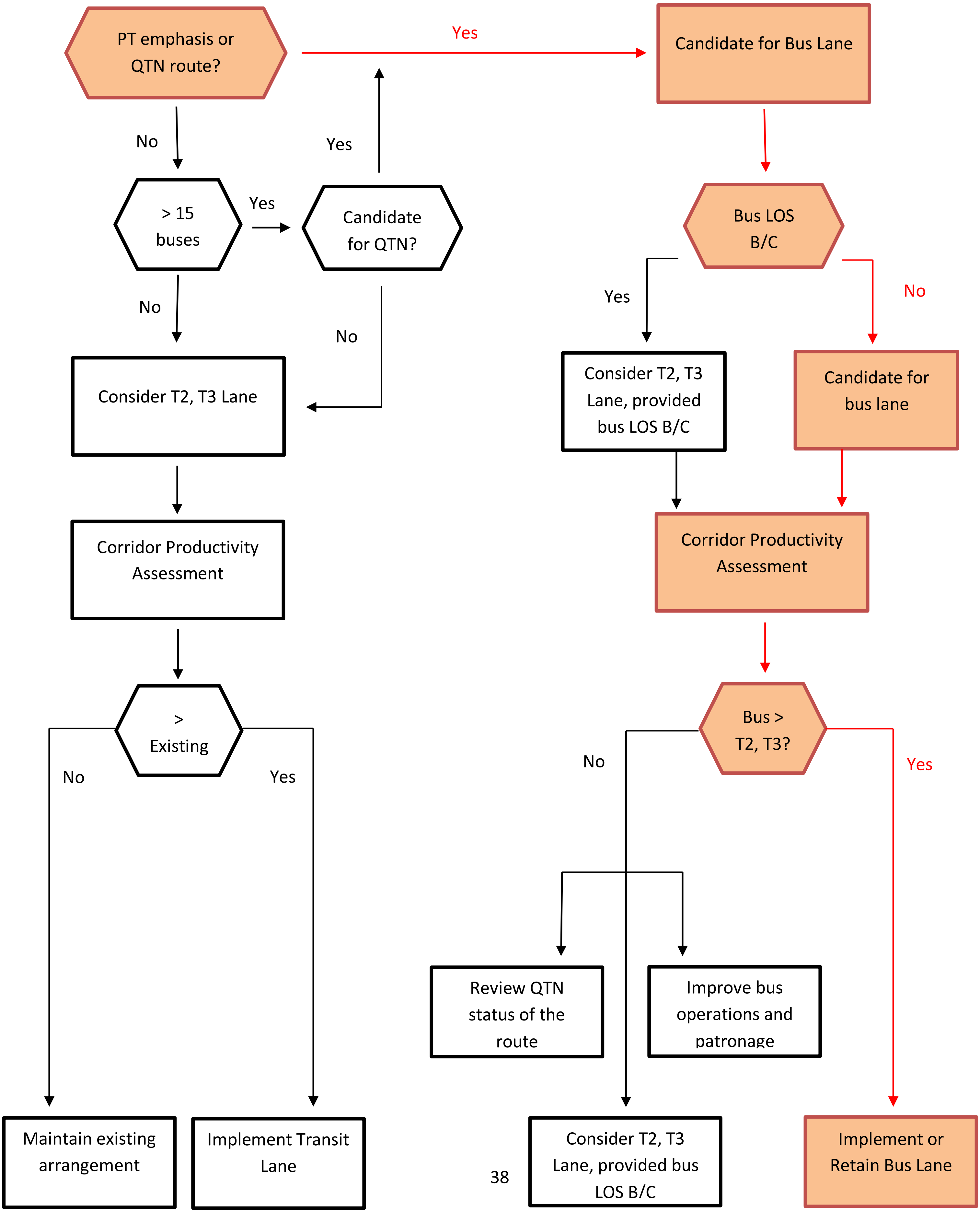
Existing Model Split by Mode				
Mode	Volume	%	Person-trips	%
Bus	25	2%	722	33%
T1 Vehicle	857	74%	857	39%
T2 Vehicle	214	19%	429	20%
T3 Vehicle	56	5%	169	8%

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%

Fanshawe Street Bus Lane Case Study



AM Peak

Mode	Travel Speed	LOS
Bus	14	F
General Traffic	15	E
T2 Traffic	15	E
T3 Traffic	15	E
Freight	15	E

Existing Model Split by Mode				
Mode	Volume	%	Person-trips	%
Bus	102	7%	5279	78%
T1 Vehicle	1217	85%	1217	18%
T2 Vehicle	107	7%	214	3%
T3 Vehicle	13	1%	40	1%

Bus Lane Scenario Model Split by Lane								
Mode	Volume	%	Person-trips	%	Speed	LOS	Productivity	% Benchmark
Bus Lane	102	7%	5279	78%	14	F	73906	194%
General Lane	1337	93%	1471	22%	15	E	22065	58%
Both Lane	1439	100%	6749	100%			47986	126%

Existing Model Split by Lane								
Mode	Volume	%	Person-trips	%	Speed	LOS	Productivity	% Benchmark
T2 Lane	222	15%	5533	82%	12	F	66396	176%
General Lane	1217	85%	1217	18%	17	E	20689	55%
Both Lane	1439	100%	6749	100%			43543	115%

T3 Lane Scenario Model Split by Lane								
Mode	Volume	%	Person-trips	%	Speed	LOS	Productivity	% Benchmark
T3 Lane	115	8%	5319	79%	14	F	74466	196%
General Lane	1324	92%	1431	21%	15	E	21465	56%
Both Lane	1439	100%	6749	100%			47966	126%

PM Peak

Mode	Travel Speed	LOS
Bus	14	F
General Traffic	11	F
T2 Traffic	11	F
T3 Traffic	11	F
Freight	11	F

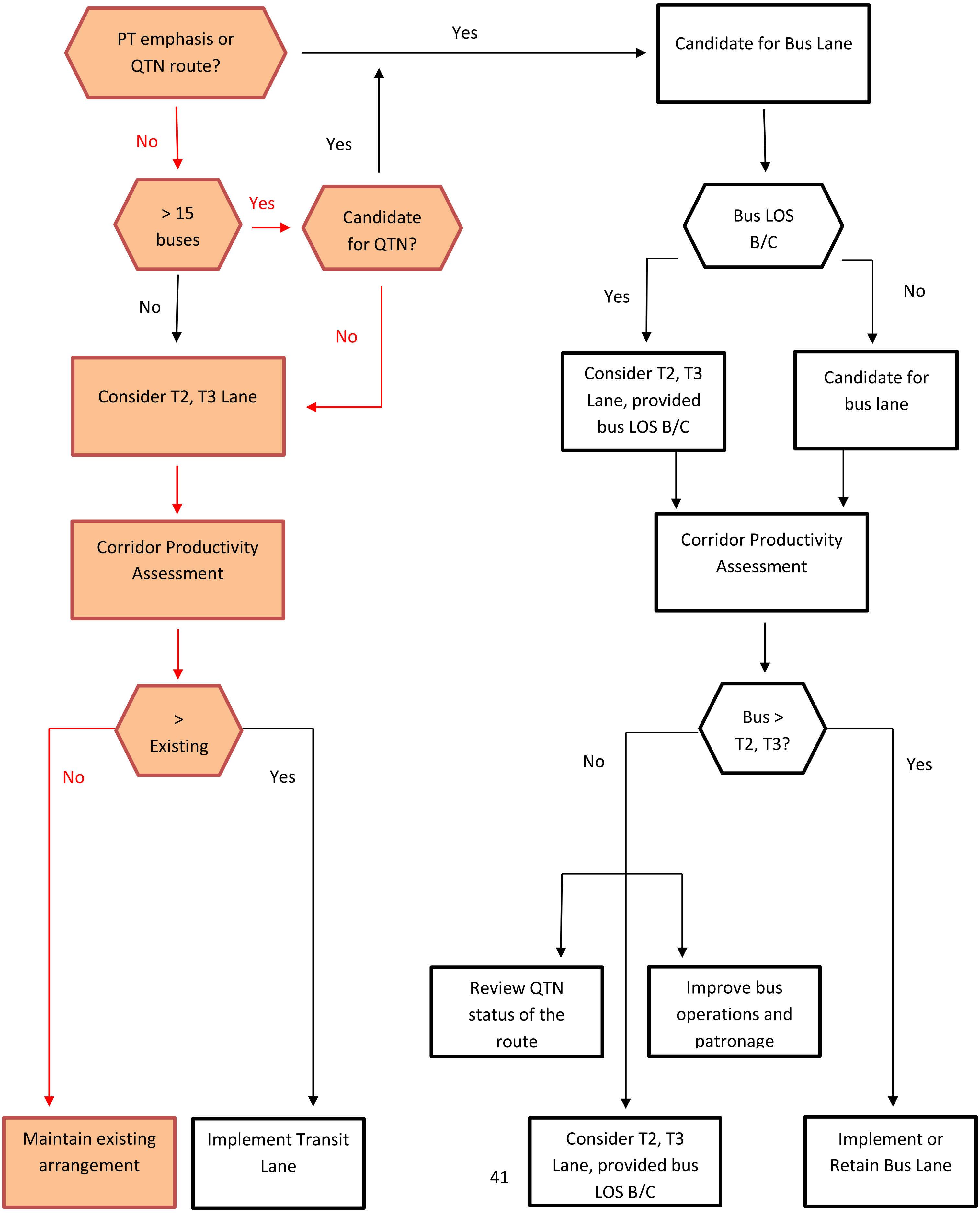
Existing Model Split by Mode				
Mode	Volume	%	Person-trips	%
Bus	83	6%	3892	72%
T1 Vehicle	1266	86%	1266	23%
T2 Vehicle	111	8%	223	4%
T3 Vehicle	14	1%	42	1%

Bus Lane Scenario Model Split by Lane								
Mode	Volume	%	Person-trips	%	Speed	LOS	Productivity	% Benchmark
Bus Lane	83	6%	3892	72%	14	F	54488	143%
General Lane	1391	94%	1530	28%	11	F	16830	44%
Both Lane	1474	100%	5422	100%			35659	94%

Existing Model Split by Lane								
Mode	Volume	%	Person-trips	%	Speed	LOS	Productivity	% Benchmark
T2 Lane	208	14%	4156	77%	10	F	41563	109%
General Lane	1266	86%	1266	23%	13	F	16456	43%
Both Lane	1474	100%	5422	100%			29009	76%

T3 Lane Scenario Model Split by Lane								
Mode	Volume	%	Person-trips	%	Speed	LOS	Productivity	% Benchmark
T3 Lane	97	7%	3934	73%	14	F	55076	145%
General Lane	1377	93%	1488	27%	11	F	16372	43%
Both Lane	1474	100%	5422	100%			35722	94%

Onewa Road T3 Transit Lane Case Study



Lower Onewa Road Case Study

AM Peak

Mode	Travel Speed	LOS
Bus	35	B
General Traffic	32	B
T2 Traffic	32	B
T3 Traffic	35	B
Freight	32	B

Existing Model Split by Mode				
Mode	Volume	%	Person-trips	%
Bus	25	2%	964	31%
T1 Vehicle	1093	72%	1093	35%
T2 Vehicle	218	14%	436	14%
T3 Vehicle	190	12%	629	20%

Existing T3 Lane Modal Split by Lane								
Mode	Volume	%	Person-trips	%	Speed	LOS	Productivity	% Benchmark
T3 Lane	215	14%	1593	51%	35	B	55755	148%
General Lane	1311	86%	1529	49%	32	B	48928	129%
Both Lane	1526	100%	3122	100%			52342	138%

Bus Lane Scenario Modal Split by Lane								
Mode	Volume	%	Person-trips	%	Speed	LOS	Productivity	% Benchmark
Bus Lane	25	2%	964	31%	38	B	36632	96%
General Lane	1501	98%	2158	69%	28	C	60424	159%
Both Lane	1526	100%	3122	100%			48528	128%

T2 Lane Scenario Modal Split by Lane								
Mode	Volume	%	Person-trips	%	Speed	LOS	Productivity	% Benchmark
T2 Lane	433	28%	2029	65%	30	B	60870	160%
General Lane	1093	72%	1093	35%	34	B	37162	98%
Both Lane	1526	100%	3122	100%			49016	129%

Upper Onewa Road Case Study

AM Peak

Mode	Travel Speed	LOS
Bus	35	C
General Traffic	47	B
T2 Traffic	47	B
T3 Traffic	35	C
Freight	35	C

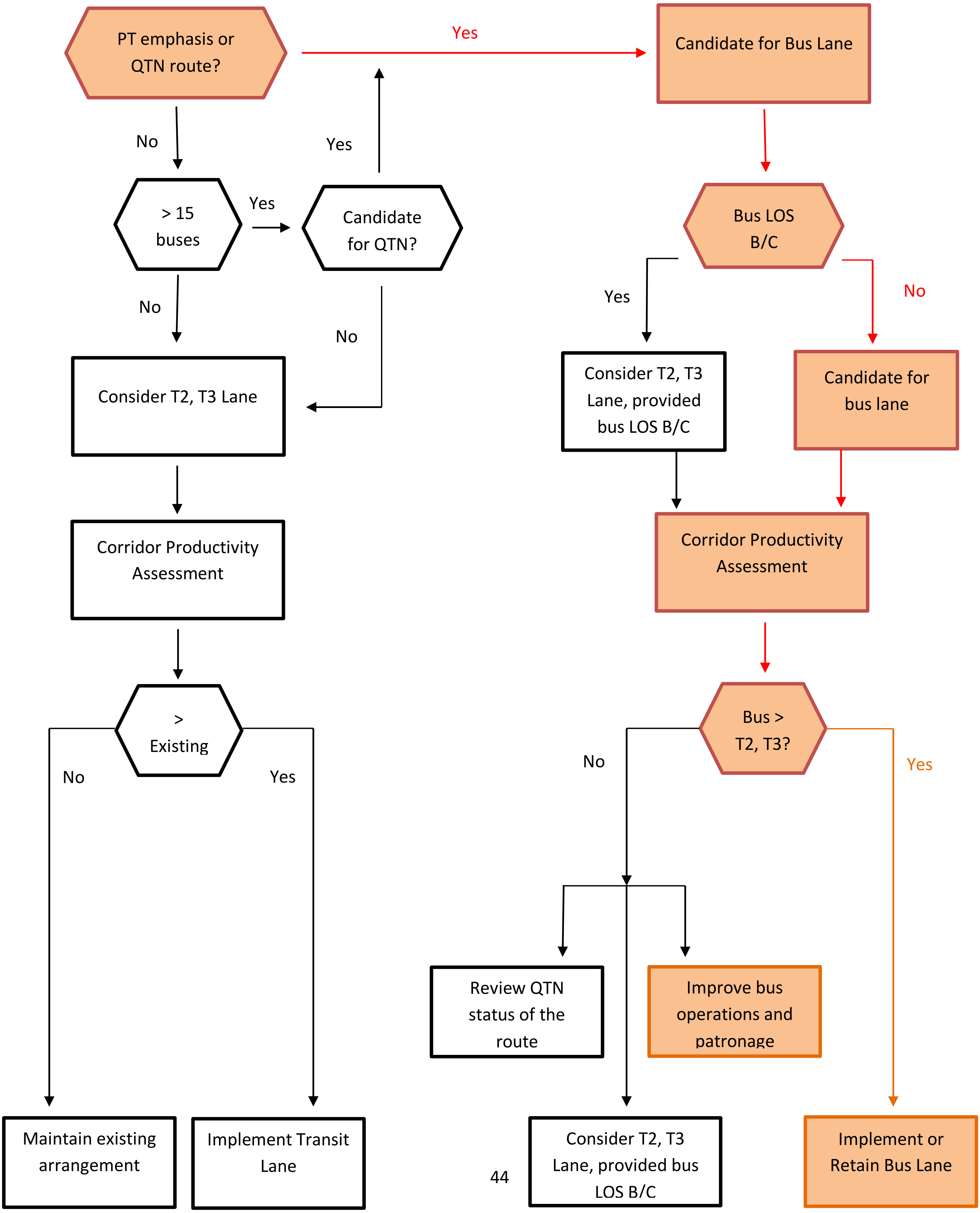
Existing Model Split by Mode				
Mode	Volume	%	Person-trips	%
Bus	32	5%	1349	51%
T1 Vehicle	353	51%	353	13%
T2 Vehicle	62	9%	124	5%
T3 Vehicle	244	35%	825	31%

Existing T3 Lane Modal Split by Lane								
Mode	Volume	%	Person-trips	%	Speed	LOS	Productivity	% Benchmark
T3 Lane	276	40%	2174	82%	35	C	76090	200%
General Lane	415	60%	477	18%	45	B	21465	56%
Both Lane	691	100%	2651	100%			48778	128%

Bus Lane Scenario Modal Split by Lane								
Mode	Volume	%	Person-trips	%	Speed	LOS	Productivity	% Benchmark
Bus Lane	32	5%	1349	51%	37	C	49913	132%
General Lane	659	95%	1302	49%	43	B	55986	147%
Both Lane	691	100%	2651	100%			50997	139%

T2 Lane Scenario Modal Split by Lane								
Mode	Volume	%	Person-trips	%	Speed	LOS	Productivity	% Benchmark
T2 Lane	338	49%	2298	87%	32	C	73536	194%
General Lane	353	51%	353	13%	47	B	16591	44%
Both Lane	691	100%	2651	100%			45064	119%

Remuera Road Bus Lane Case Study



Remuera Road Case Study

AM Peak

Mode	Travel Speed	LOS
Bus	21	D
General Traffic	28	C
T2 Traffic	28	C
T3 Traffic	28	C
Freight	28	C

Existing Model Split by Mode				
Mode	Volume	%	Person-trips	%
Bus	23	2%	722	34%
T1 Vehicle	820	74%	820	38%
T2 Vehicle	220	20%	440	21%
T3 Vehicle	50	4%	150	7%

Existing Bus Lane Scenario								
Mode	Volume	%	Person-trips	%	Speed	LOS	Productivity	% Benchmark
Bus Lane	23	2%	722	34%	21	D	15153	40%
General Lane	1090	98%	1410	66%	28	C	39480	104%
Both Lane	1113	100%	2132	100%			27316	72%

T2 Lane Scenario								
Mode	Volume	%	Person-trips	%	Speed	LOS	Productivity	% Benchmark
T2 Lane	293	26%	1312	62%	20	D	26240	69%
General Lane	820	74%	820	38%	29	C	23780	63%
Both Lane	1113	100%	2132	100%			25010	66%

T3 Lane Scenario								
Mode	Volume	%	Person-trips	%	Speed	LOS	Productivity	% Benchmark
T3 Lane	73	4%	872	41%	21	D	18312	48%
General Lane	1040	54%	1260	59%	28	C	35280	93%
Both Lane	1113	58%	2132	100%			26796	71%

General Lane Scenario								
Mode	Volume	%	Person-trips	%	Speed	LOS	Productivity	% Benchmark
Lane 1	440	40%	1262	59%	20	D	25240	66%
Lane 2	673	60%	870	41%	28	C	24360	64%
Both Lane	1113	100%	2132	100%			24800	65%

PM Peak

Mode	Travel Speed	LOS
Bus	20	D
General Traffic	28	C
T2 Traffic	28	C
T3 Traffic	28	C
Freight	28	C

Existing Model Split by Mode				
Mode	Volume	%	Person-trips	%
Bus	14	1%	290	18%
T1 Vehicle	780	75%	780	49%
T2 Vehicle	200	19%	400	25%
T3 Vehicle	40	4%	120	8%

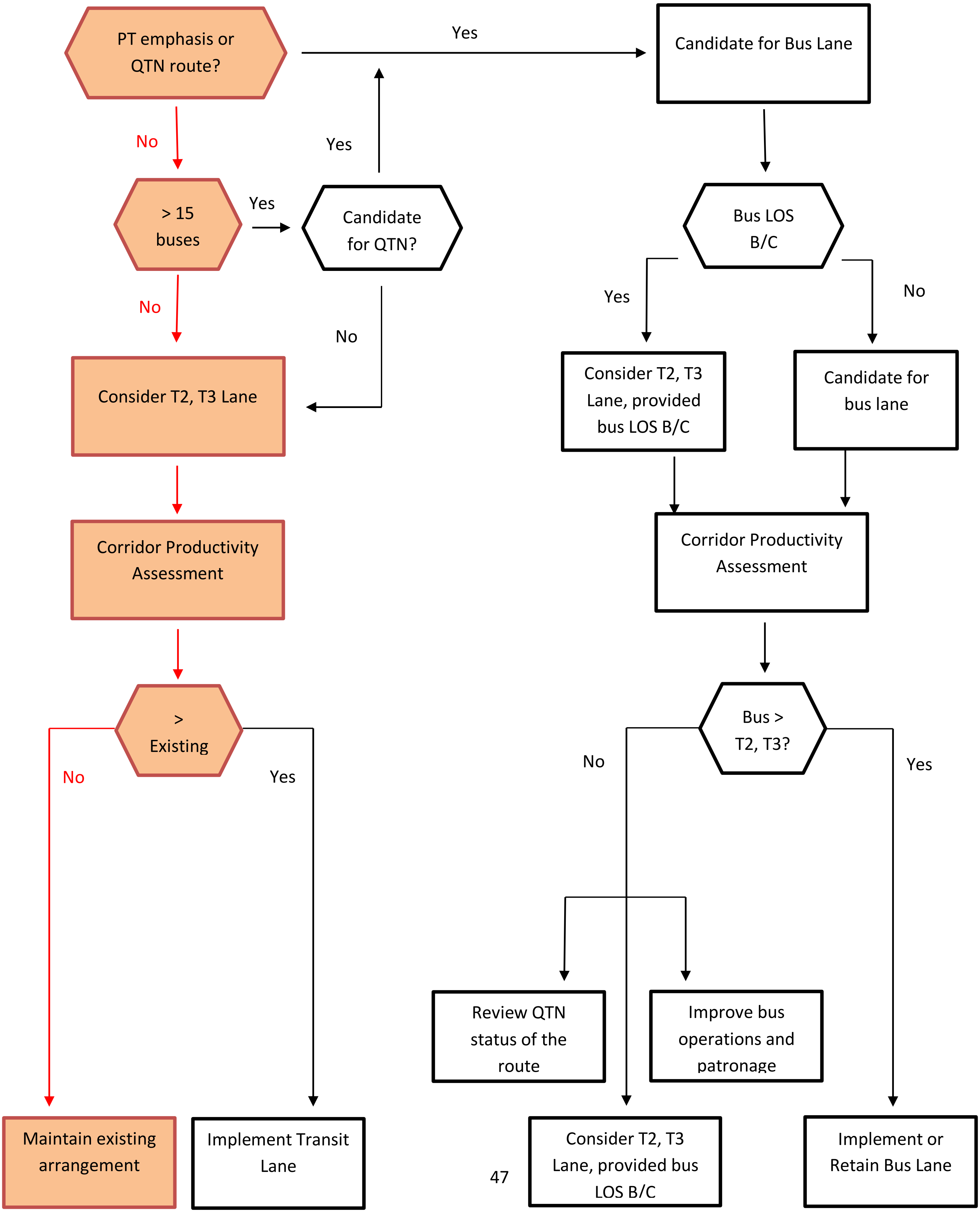
Existing Bus Lane Scenario								
Mode	Volume	%	Person-trips	%	Speed	LOS	Productivity	% Benchmark
Bus Lane	14	1%	290	18%	20	D	5807	15%
General Lane	1090	99%	1300	82%	28	C	36400	96%
Both Lane	1104	100%	1590	100%			21104	56%

T2 Lane Scenario								
Mode	Volume	%	Person-trips	%	Speed	LOS	Productivity	% Benchmark
T2 Lane	254	25%	810	51%	25	C	20250	53%
General Lane	780	75%	780	49%	29	C	22620	60%
Both Lane	1034	100%	1590	100%			22260	59%

T3 Lane Scenario								
Mode	Volume	%	Person-trips	%	Speed	LOS	Productivity	% Benchmark
T3 Lane	54	3%	410	26%	25	C	10250	27%
General Lane	980	54%	1180	74%	28	C	33040	87%
Both Lane	1034	57%	1590	100%			21645	57%

General Lane Scenario								
Mode	Volume	%	Person-trips	%	Speed	LOS	Productivity	% Benchmark
Lane 1	450	37%	810	51%	24	C	19440	51%
Lane 2	654	63%	780	49%	29	C	22620	60%
Both Lane	1034	100%	1590	100%			21030	55%

Tamaki Drive T2 Transit Lane Case Study



Tamaki Drive Case Study

AM Peak

Mode	Travel Speed	LOS
Bus	27	C
General Traffic	17	E
T2 Traffic	27	C
T3 Traffic	27	C
Freight	27	C

Existing Model Split by Mode				
Mode	Volume	%	Person-trips	%
Bus	13	1%	354	16%
T1 Vehicle	1065	74%	1065	48%
T2 Vehicle	305	21%	610	28%
T3 Vehicle	56	4%	168	8%

Existing Model Split by Lane								
Mode	Volume	%	Person-trips	%	Speed	LOS	Productivity	% Benchmark
T2 Lane	374	26%	1132	52%	27	C	30564	80%
General Lane	1065	74%	1065	48%	17	E	18105	48%
Both Lane	1439	100%	2197	100%			24335	64%

Bus Lane Scenario Model Split by Lane								
Mode	Volume	%	Person-trips	%	Speed	LOS	Productivity	% Benchmark
Bus Lane	13	1%	354	16%	35	C	12390	33%
General Lane	1426	99%	1843	84%	13	F	23959	63%
Both Lane	1439	100%	2197	100%			18175	48%

T3 Lane Scenario Model Split by Lane								
Mode	Volume	%	Person-trips	%	Speed	LOS	Productivity	% Benchmark
T3 Lane	69	5%	522	24%	35	C	18270	48%
General Lane	1370	95%	1675	76%	14	E	23450	66%
Both Lane	1439	100%	2197	100%			20124	55%

3. Design Templates

Note that the following templates represent acceptable applications. It is recommended to adopt each of these templates, but with the proposed green and white line marking for the bus or transit lane.

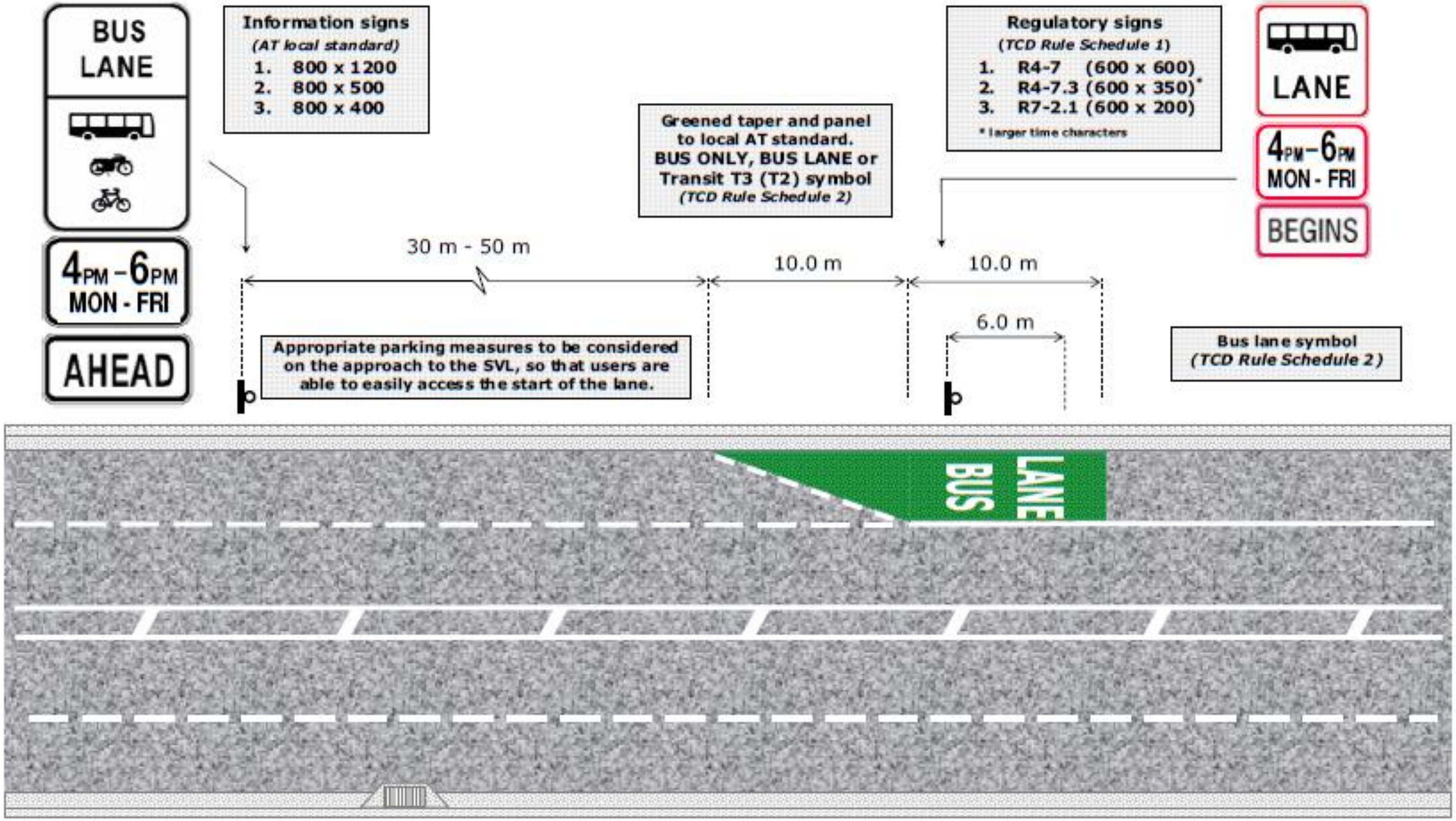


Figure 1
SVL Advance and start
Advance sign, symbol, greened panel and BEGINS sign

1 SVL Advance and start [Series 4]

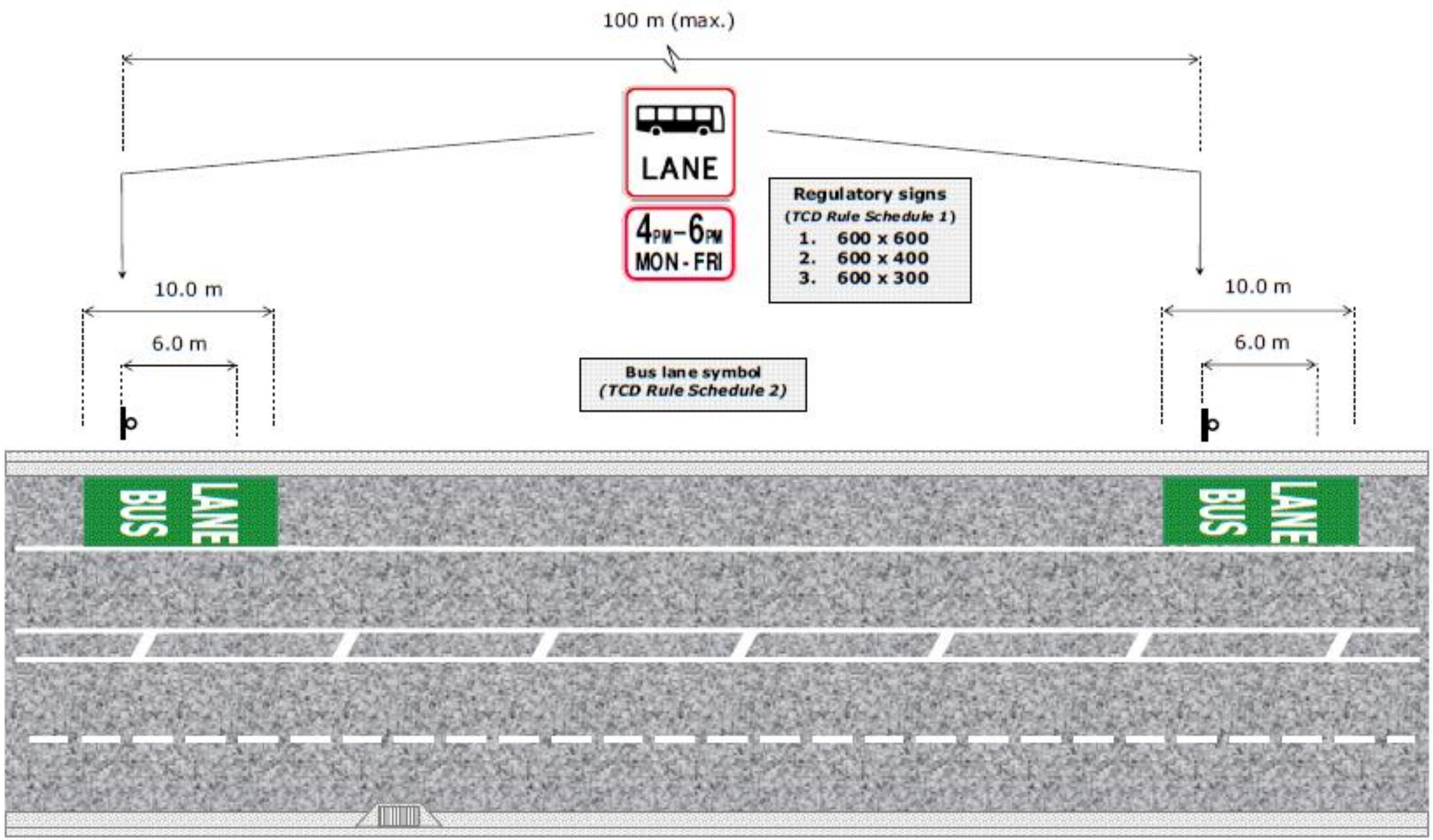


Figure 2
SVL Repeatability
Symbol, greened panel and sign maximum spacing

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2 SVL Advance and start [Series 4]

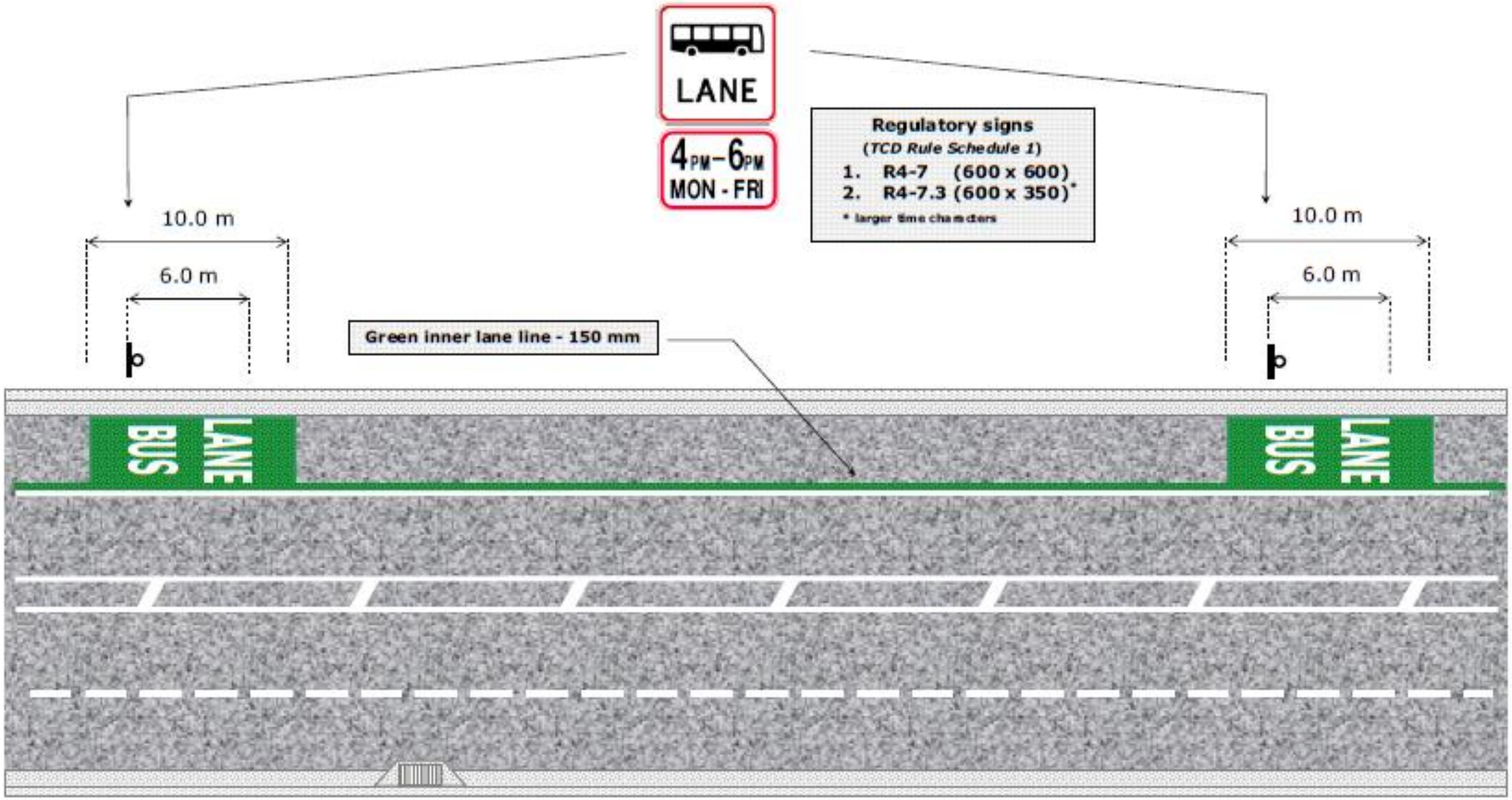

Figure 2.1
SVL lane line delineation
Addition of green lane line between greened panels

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2.1 SVL lane line [Series 4]

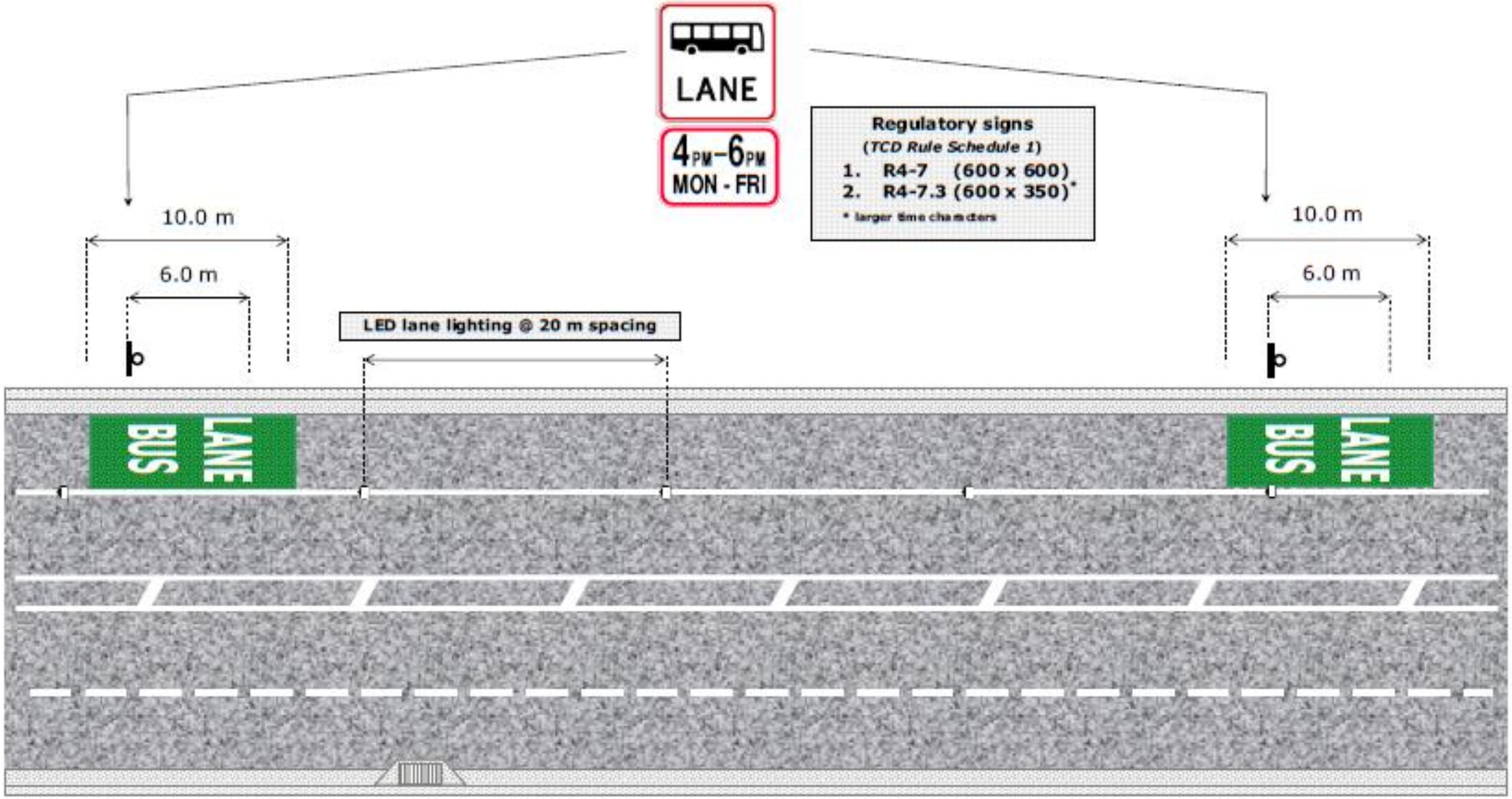

Figure 2.2
SVL Lane line lighting
Addition of LED shoulder lane lights

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2.2 SVL lane line lighting [Series 4]

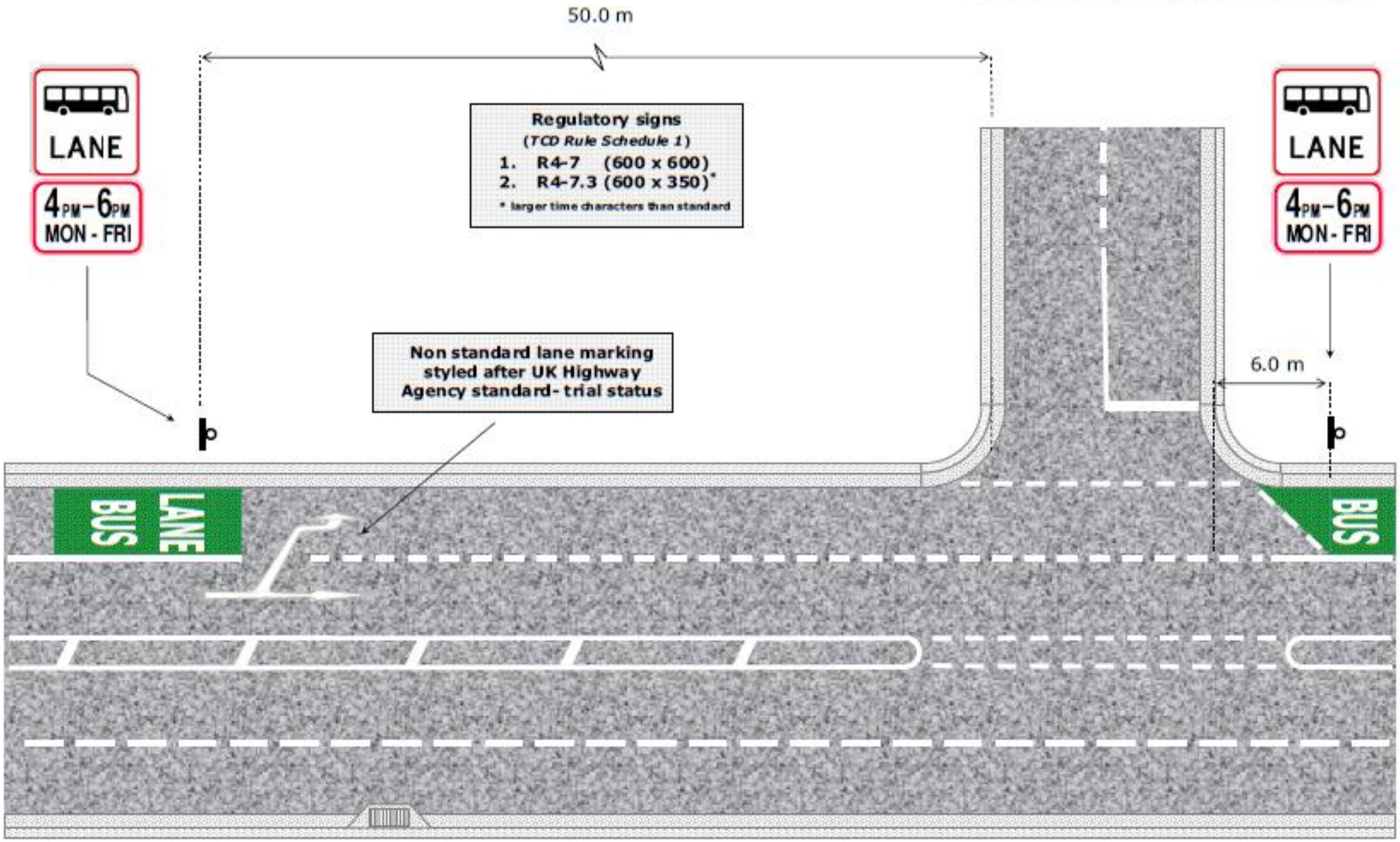

Figure 3

SVL Minor intersection approach

Symbols, greened panels, signs and indicator arrow for 50 metre mark

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3 SVL minor intersection approach [Series4]

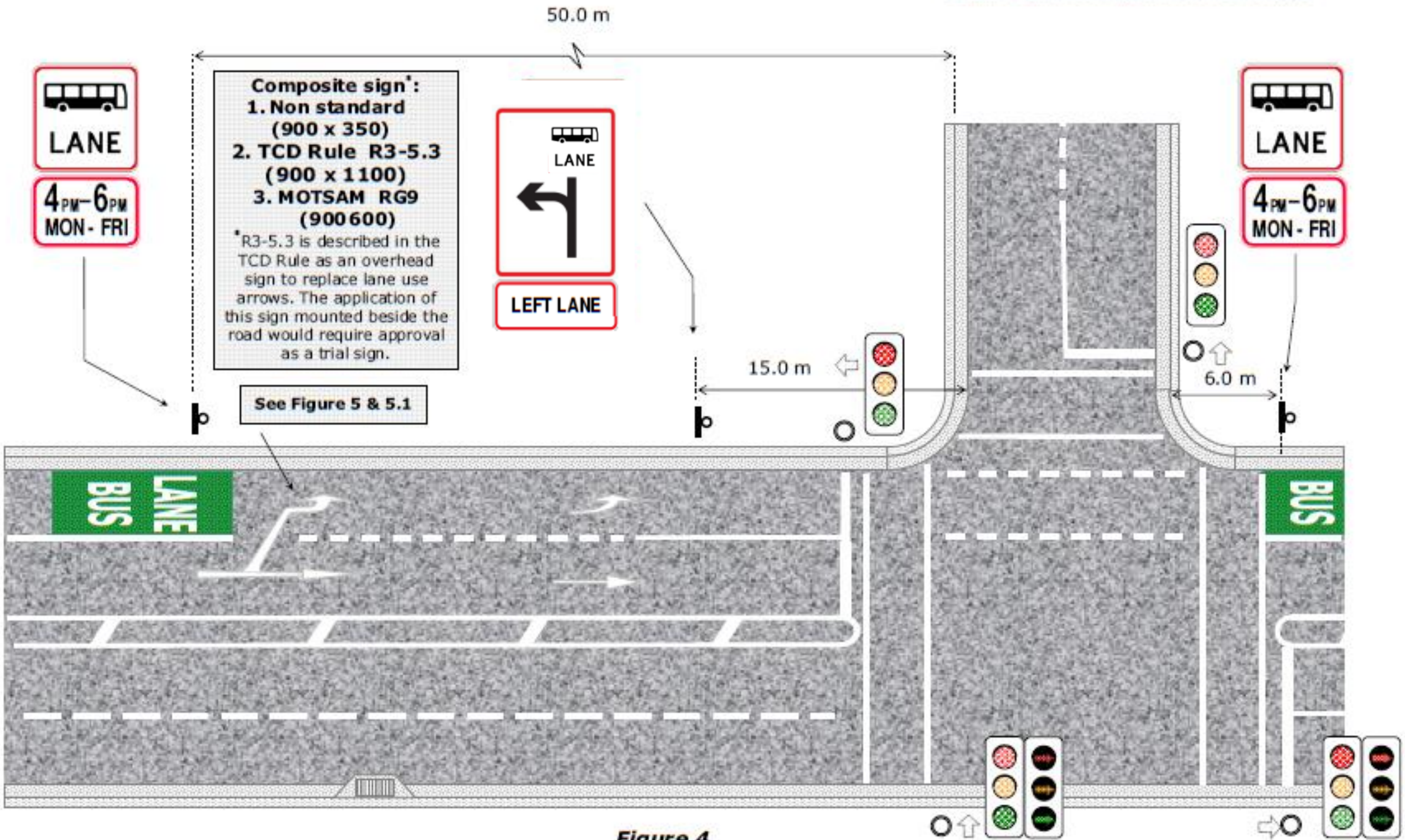

Figure 4

SVL Signalised intersection (option with left turn lane arrow and sign)
Symbols, greened panels, signs and indicator arrow for 50 metre mark

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4 SVL signalised intersection [Series 4]

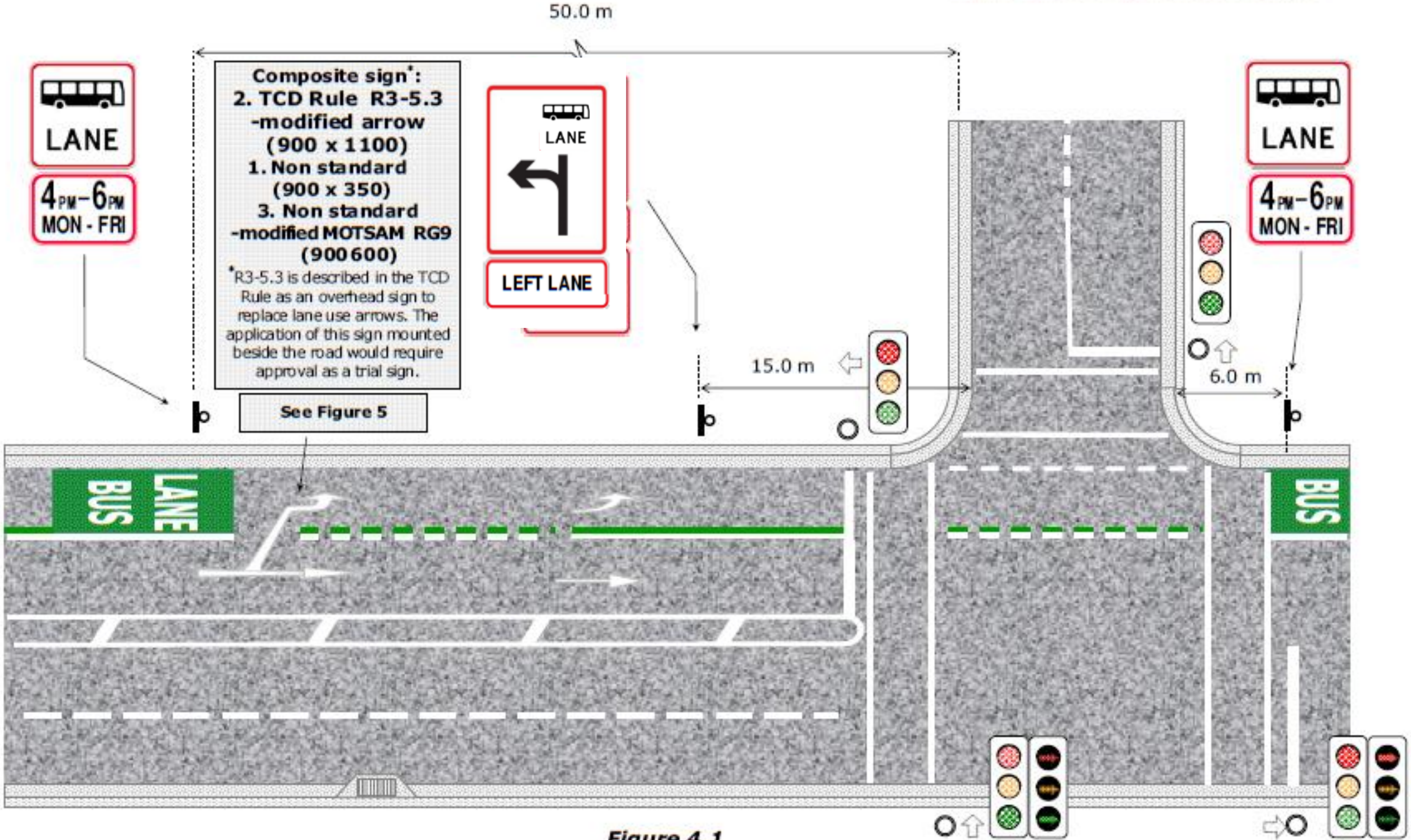

Figure 4.1

SVL Signalised intersection (option with left turn lane arrow and sign)

Symbols, greened panels /lane line, signs and indicator arrow for 50 metre mark

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An Auckland Council Organisation

4.1 SVL signalised intersection [Series 3]

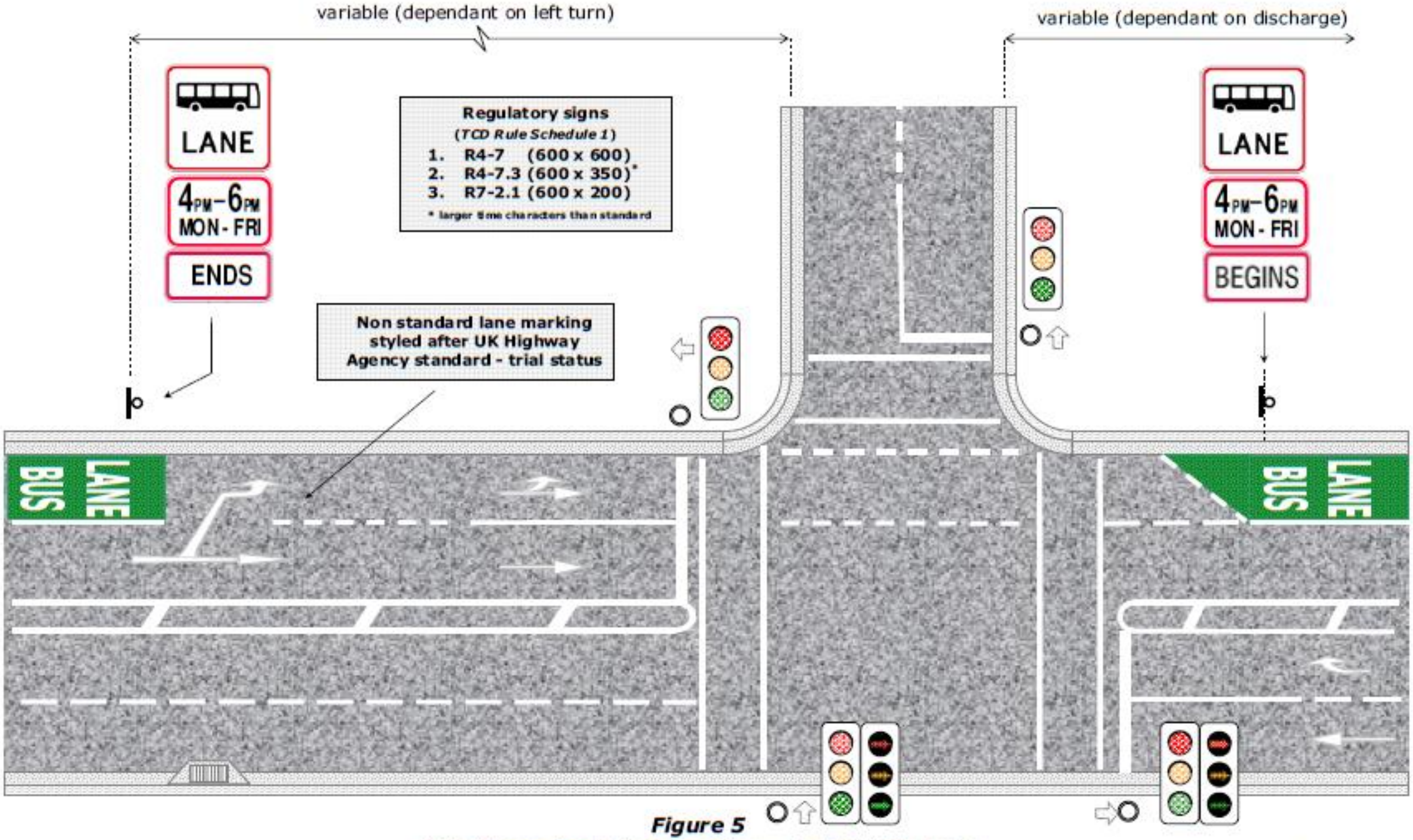

Figure 5

SVL Signalised intersection - ENDS / BEGINS

Symbols, greened panels, signs and indicator arrow for 50 metre mark

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5 SVL signalised intersection [Series 4]

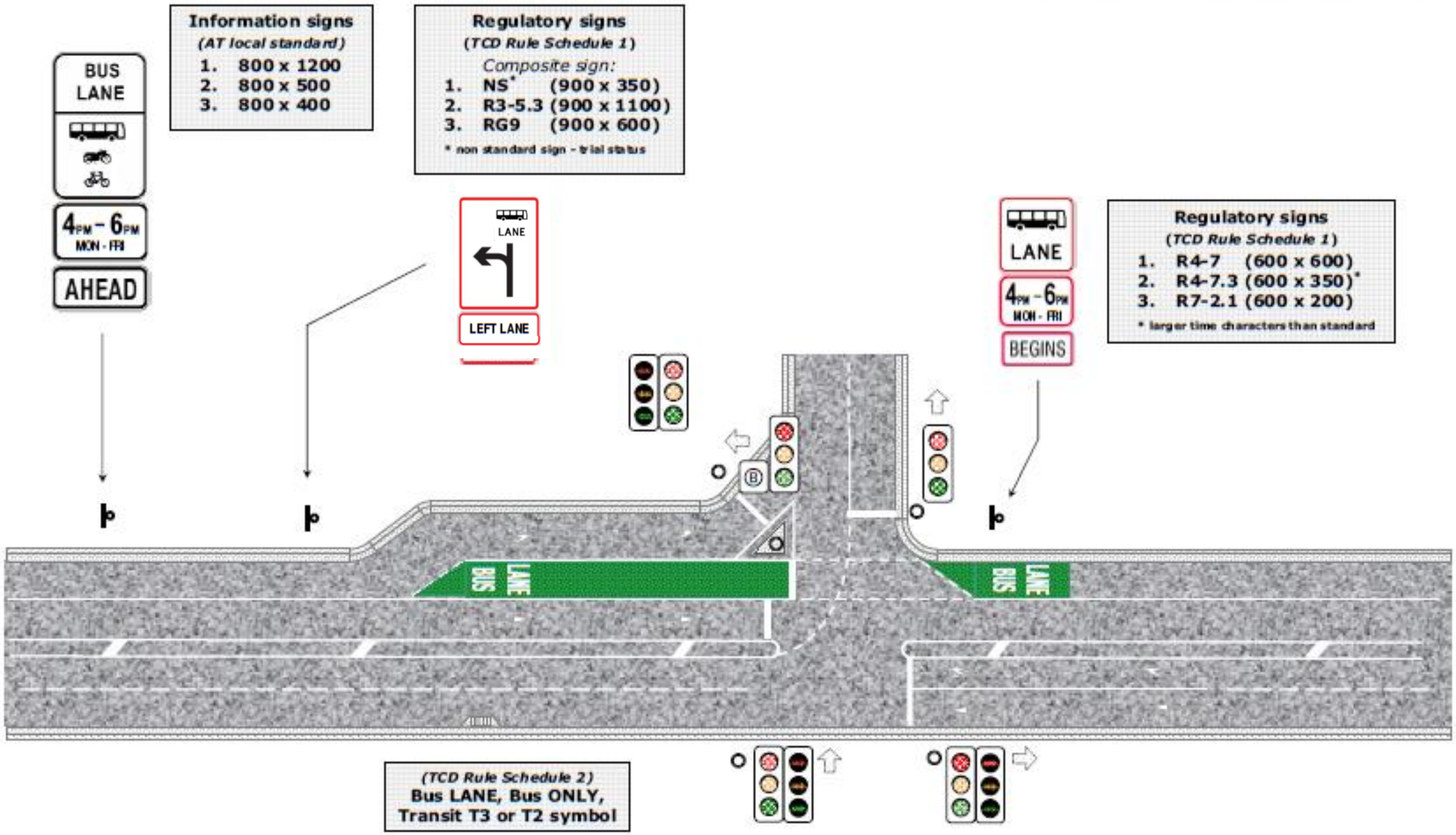

Figure 6

SVL Bus advance bay and left turn only lane

Advance sign, symbol, greened panel and 24 hour sign prior to intersection

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An Auckland Council Organisation

6 SVL bus advance bay [Series 4]

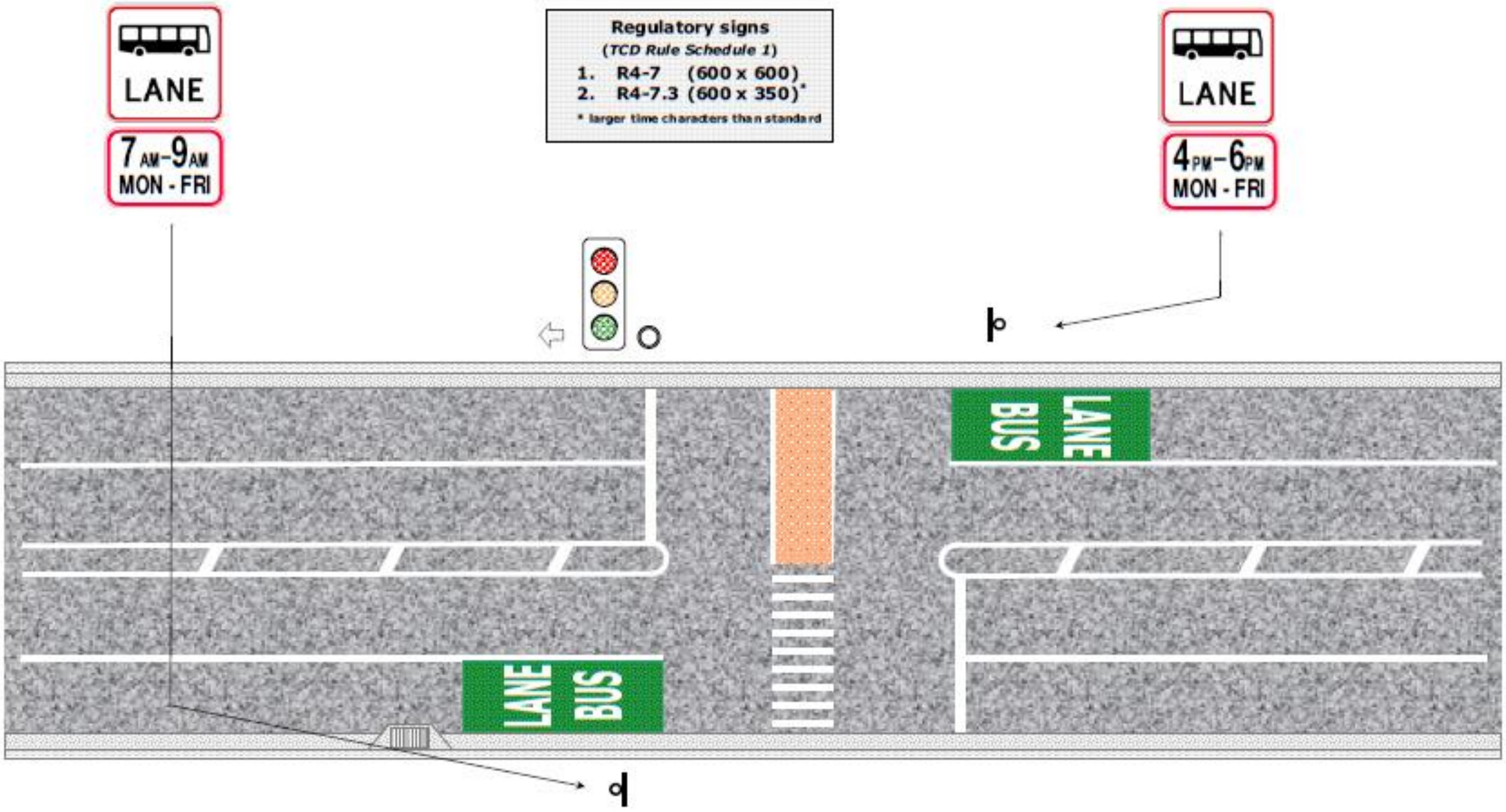

Figure 7

SVL Signalised pedestrian or zebra crossing

Symbols, greened panels and signs after crossing

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An Auckland Council Organisation

7 SVL signalised pedestrian_zebra crossing [Series 4]

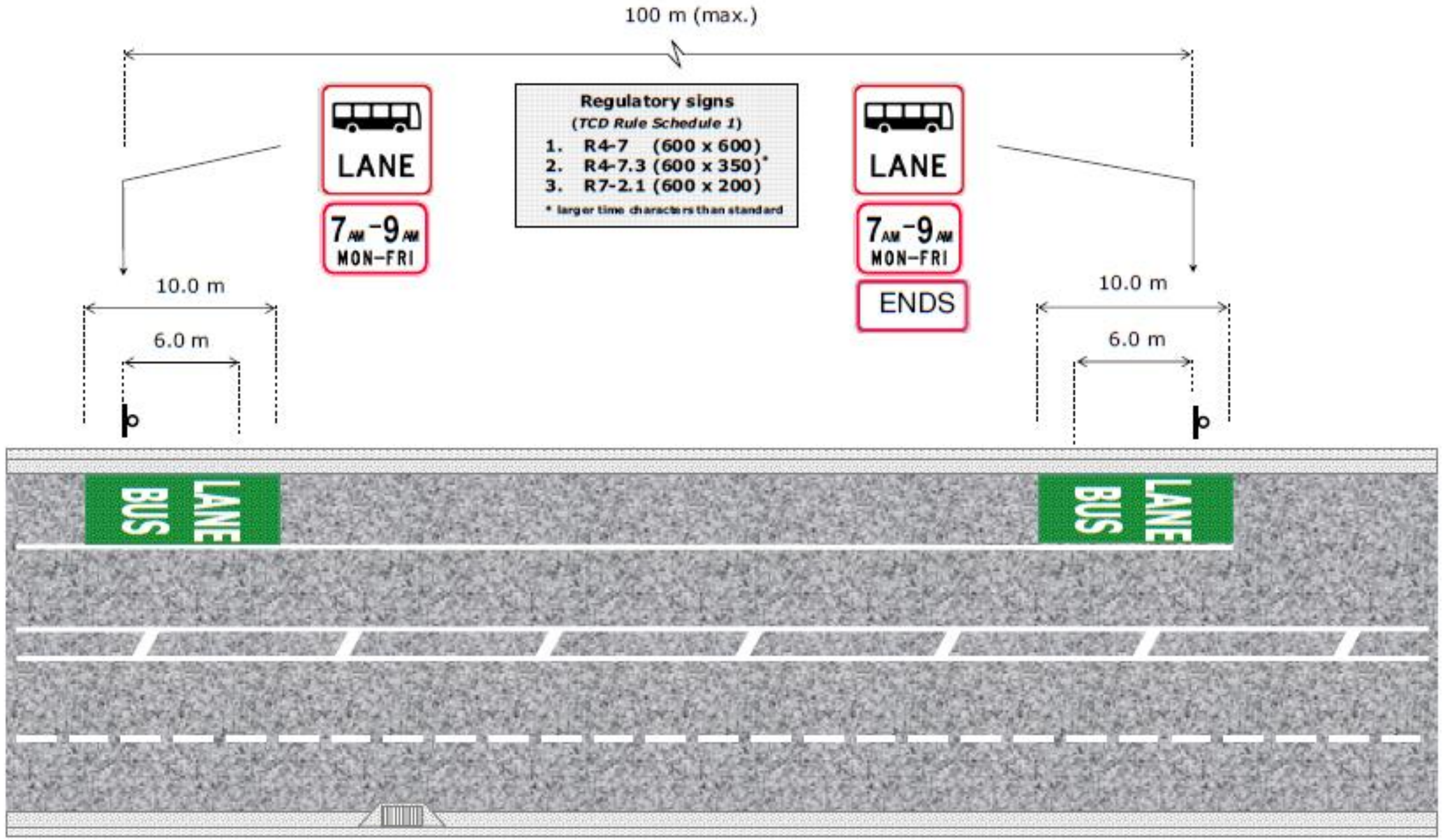

Figure 8
SVL Termination
Symbol, greened panel and signs

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An Auckland Council Organisation

8 SVL termination [Series 4]

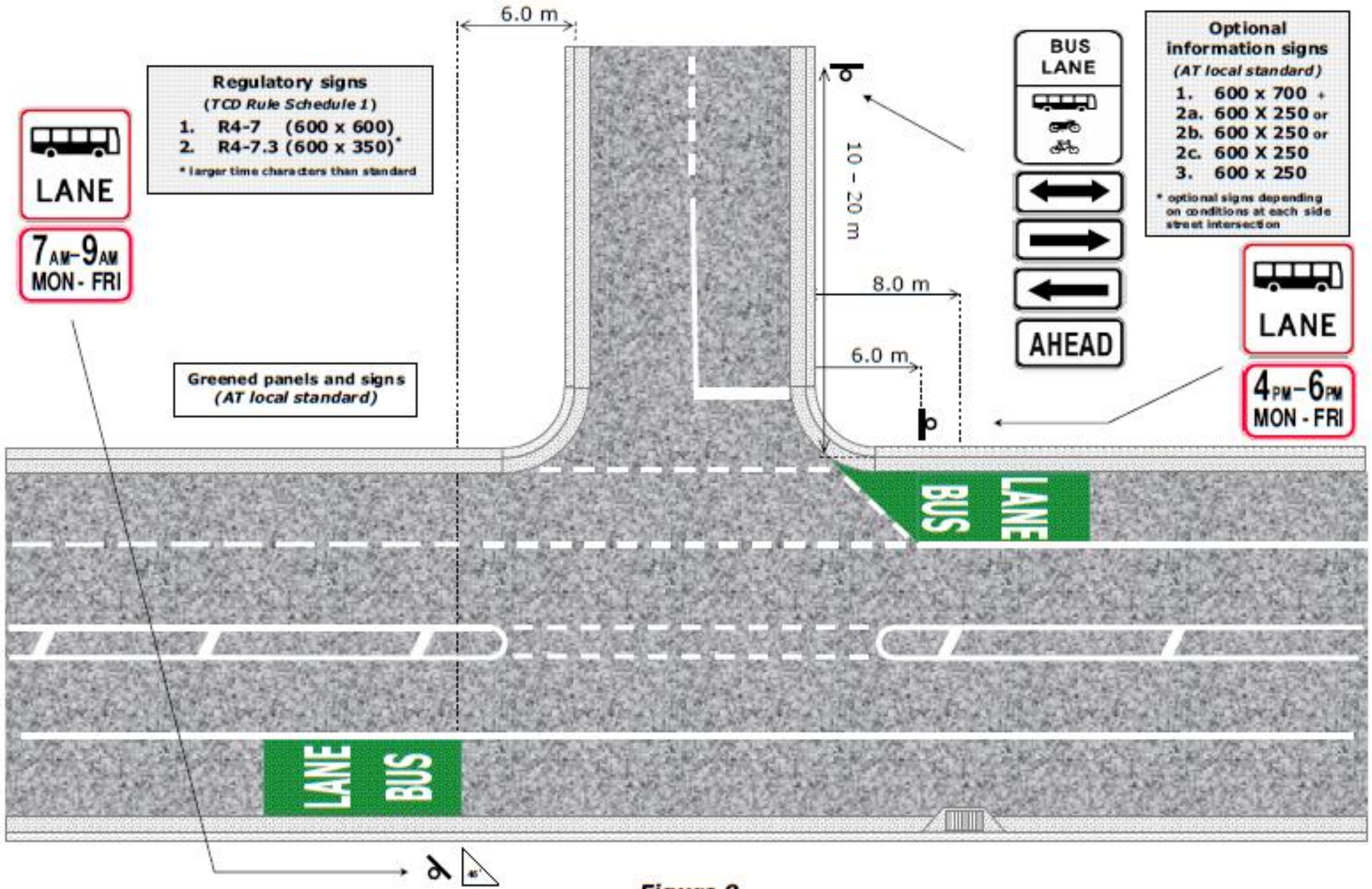

Figure 9

SVL Side Street and opposite direction AM or PM sign, symbol and panel

1. Optional side street signs. 2. Greened panel and symbol offset from intersection.

Auckland Transport
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9 SVL side street [Series 4]

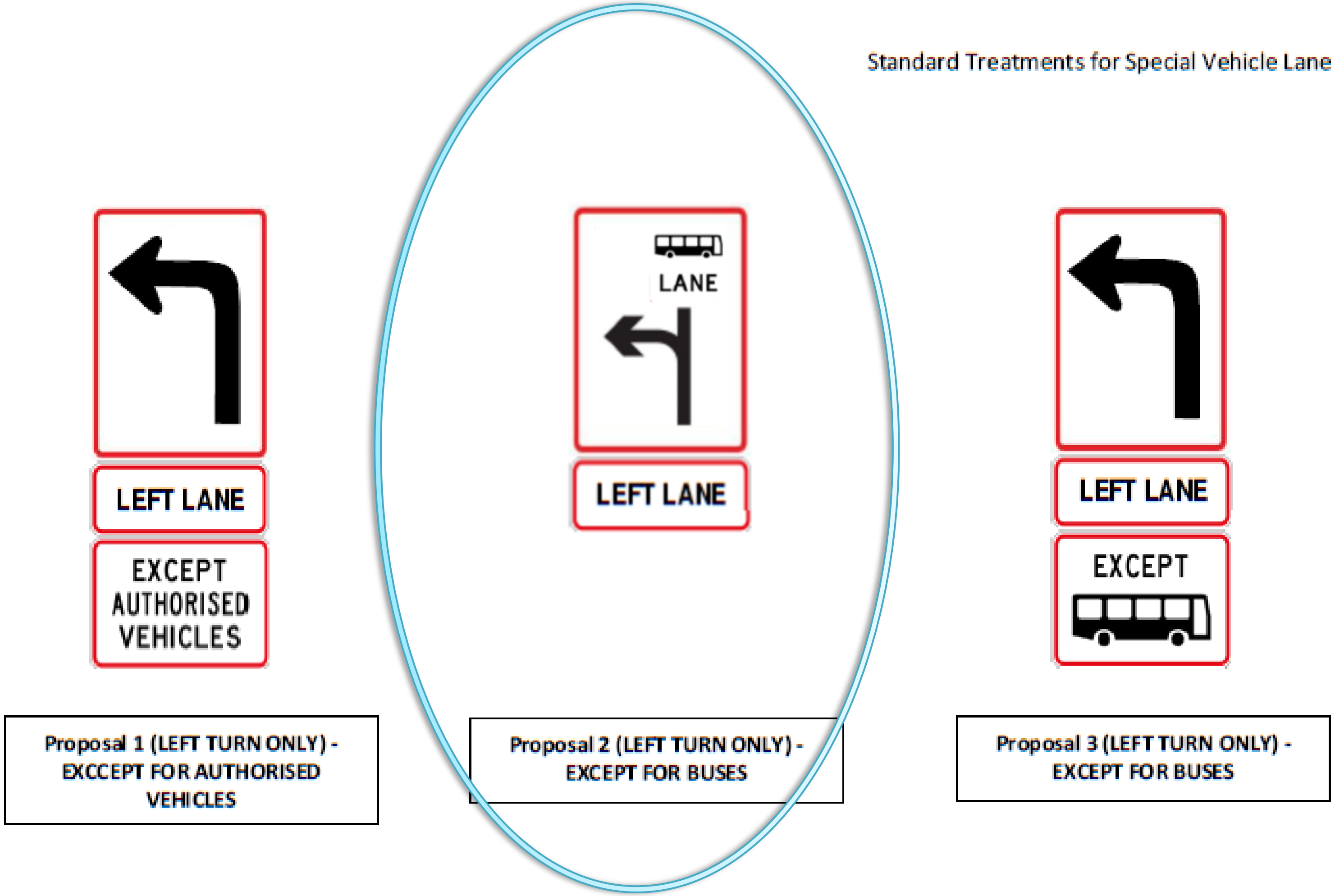

Figure 10.1

SVL Signs for LEFT TURN /STRAIGHT AHEAD only lanes

Exceptions to compliance with Lane Use Arrows for authorised SVL vehicles

10.1 SVL left turn_straight ahead only lane [Series 4]

4. Definitions

Special vehicle lanes (bus and transit lanes)
As described in Part 2 of the Land Transport Rule: Traffic Control Devices (2006), the definition of:

Special vehicle lane means a lane defined by signs or markings and restricted to a specified class or classes of vehicle; and includes a bus lane, a transit lane, a cycle lane, and a light-rail vehicle lane.

.
Bus lane means a lane reserved by a marking or sign installed at the start of the lane and at each point at which the lane resumes after an intersection, for the use of:
(a) buses; and
cycles, mopeds and motorcycles (unless any or all are specifically excluded by the signs).

Transit lane means a lane reserved for the use of the following (unless specifically excluded by a sign installed at the start of the lane):
(a) passenger service vehicles;
(b) motor vehicles carrying not less than the number of persons (including the driver) specified on the sign;
(c) cycles;
(d) motorcycles;
(e) mopeds.

A RTN involves a passenger transport system with a high capacity, high frequency, high quality service operating on 'transport spines' that does not get held up by road congestion i.e. primarily has its own right of way.
A QTN involves a passenger transport system with a fast, high frequency and high quality passenger transport service between key centres, mainly based on major bus or public transport emphasis corridors with extensive bus priority measures, modern buses and facilities, and branded services.
Note that:

- the RTN:
  - provides the lowest level of coverage with less than 10% of the PT network
  - attracts high levels of demand with 25% of PT boardings, and 50% of passenger kilometres
  - is used for long distance trips averaging around 16 km, hence is most effective means of reducing congestion as it attracts longer distance trips
  - best level of utilisation with 40% of passenger km seat capacity occupied
- the QTN:
  - provides more coverage to RTN, but less than LCN, with around 20% of the PT network
  - attracts high level of demand with 45% of PT boardings, and 35% of passenger kilometres
  - is used for medium distance trips averaging around 7 km
  - has good levels of utilisation with 36% of passenger km seat capacity occupied
  - A QTN involves a passenger transport system with a fast, high frequency and high quality passenger transport service between key centres, mainly based on major bus or public transport emphasis corridors with extensive bus priority measures, modern buses and facilities, and branded services.

- the LCN:
  - provides a high level of coverage with 70% of the PT network, and 30% of seat km capacity
  - attracts relatively low level of demand around 30% of PT boardings and 15% of passenger kilometres
  - is used for relatively short trips averaging around 5 km, as would be expected
  - therefore has low level of utilisation with around 18% of passenger km seat capacity occupied