

## **Shared Lane Markings Review**

Investigation of Use, Symbol Type and  
International Best Practice

March 2013



TRANSPORTATION SPECIALISTS

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## EXECUTIVE SUMMARY

This report investigates the use of shared lane markings both internationally as well as recommending the design and use of shared lane markings in the first instance within the Auckland region but with the goal of shared lane markings being used nationally.

The need for a shared lane marking within the NZ context has arisen due to the need to try and provide an additional “toolbox” measure to help in the design of infrastructure. Internationally the use of shared lane markings has, on the whole, proved successful in improving safety, wayfinding and awareness of cyclist routes.

With respect to introducing a shared lane marking into NZ there are a number of matters that require further consideration. Namely these are:

- ◆ The need to understand the legality of such a marking coupled with how it affects the existing legislation with respect to the cycle lane symbol; is a key matter to be resolved.
- ◆ How the existing legislation could be altered if necessary
- ◆ The preferred design for a shared lane marking.

With respect to the design of the shared lane marking it is recommended that the existing cycle symbol be retained, and that this be supplemented with chevron arrow markings, as illustrated in Section 6.2.4. With the cycle symbol being the same as that used to denote a cycle lane (as per the special vehicle lane requirements of the TCD Rules) this therefore requires further consideration as to the legal implications.

A number of options have been investigated with respect to possible changes to the TCD Rule given the regulatory status given to the existing cycle symbol. Any changes to the TCD Rules will be need to be worked through nationally as the changes could affect all existing special vehicle lanes throughout the country.

The simplest solution to the TCD Rule could be to adopt a new shared lane marking as an advisory type marking. Although the use of the cycle symbol within the new shared lane marking may conflict with existing cycle symbol listed in the TCD rule, one may argue the difference in its overall appearance such as the chevron add-ons and the lack of edge lines alongside a shared lane marking, justifies the shared lane marking in its entirety as a different symbol.

If it is concluded that the TCD Rule does need to be amended to reinforce the legal status of a cycle lane it is recommended that consideration be given to adopting an edge line as a requirement to denote a special vehicle lane. This is currently “best practice” for bus, transit and cycle lanes and hence would not appear to have any significant effect on the existing infrastructure.

The primary characteristics for the use of shared lane markings on a route are:

- ◆ low vehicle volumes
- ◆ low vehicle speeds

- ◆ the operational characteristics of the carriageway, including the available width ,terrain and vehicle composition.

To achieve these measures it may be necessary to complement shared lane markings with treatments that optimise a particular route for cyclists. Treatments can include traffic calming measures to both slow and/or remove vehicles from the corridor, signage, and intersection crossing treatments – all of which are aimed at providing a safe and convenient route for cyclists of all confidence levels

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## 1 INTRODUCTION

### 1.1 Background

On November 23 2012, a National Cycling Signs and Markings Working Group meeting took place at the NZTA National Office in Wellington. The purpose of this meeting was to discuss issues surrounding the provision of adequate information for cyclists and other road users. As part of this working group meeting a number of issues were identified with regards to the following areas:

- ◆ Cycling is not seen as part of an integrated network solution, which affects the quality and quantity of the cycling network
- ◆ Disconnected networks geared towards motor vehicles potentially make cyclists feel they don't belong on the network
- ◆ A limited toolbox leads to a lack of understanding of cycle signs, markings and infrastructure.

As a result, Auckland Transport has taken a lead role in further investigating the potential use of shared lane markings within New Zealand and has commissioned Flow Transportation Specialist Ltd (Flow) to investigate the use of shared lane markings internationally with regard to symbol type and operational uses and to make recommendations as to the use of shared lane markings in the first instance within the Auckland region but with the goal of shared lane markings being used nationally.

### 1.2 History

The first shared lane markings, illustrated in Figure 1, known as the bike-in-house design was developed in Denver 1993 Master Plan. Its initial purpose was to provide an indication and direction of on-road designated cycle routes where formal cycle lanes were deemed unsafe or unpractical as well as increasing the awareness for drivers as to the presence of cyclists.

Figure 1: Bicycle Arrow Stencil



Internationally, different types of road markings are used to indicate the likely presence of cyclists to motorists. A number of examples used overseas are illustrated in Appendix A, with the more popular symbols shown on **Error! Reference source not found.**. These “shared-lane markings” or “sharrows” are used in a number of countries, for example Australia, Canada and the United States. These road markings generally involve some sort of directional arrow and a cycle symbol. They are generally painted in the general vehicle lane to indicate the presence of cyclists and the safe location for cyclists to ride.

Case studies have indicated that the correct use of shared lane markings will:

- ◆ Increase safety margin between cyclists and parked vehicles to mitigate “doored” incidents
- ◆ Improve spacing between vehicles and cyclists during overtaking manoeuvres
- ◆ Increase the safety margin between a cyclist and on road hazards such as sunken catchpits, street furniture and uneven kerb and channel
- ◆ Reduce wrong-way and/or riding on the footpath
- ◆ Increase spacing between parked and moving vehicles, thereby increasing operating space for cyclists
- ◆ Provide guidance of travel path for cyclist prior to on coming hazards such as narrow road ways.

Figure 2: Examples of shared lane markings adopted around the world



Bike in House

Modified Bike in House

Bike and Chevrons

### 1.3 New Zealand’s Implementation

With New Zealand seeking to formalise a standard for shared lane markings, a number of issues have been raised with regards to its similarities with existing cycle markings and the potential confusion generated for all road users. Furthermore, as the existing cycle symbol is legislated within New Zealand’s Traffic Control Devices (TCD) rule to denote a special vehicle lane, any misuse of the existing cycle symbol may result in legality issues with the Land Transport Act 1998.

## 2 EXISTING SHARED LANE MARKINGS REVIEW

A review of the international use of shared lane markings has been conducted referencing several sources, primarily published in USA and Australia, in relation to shared lane marking’s purpose, effectiveness and implementation guidelines.



## 2.1 United States

### 2.1.1 San Francisco

The city of San Francisco in United States undertook what seems to be the first major research into the subject of shared lane markings in 2004<sup>1</sup>. The goal of the research was to assess the effectiveness of the shared lane markings in achieving the required outcomes, the most important being:

- ◆ Improving the position of vehicles and cyclists on roads without cycle lanes
- ◆ Reducing aggressive behaviour towards cyclists
- ◆ Encouraging of correct riding behaviour

After analysis of over 140 hours of video material, the study found that

- ◆ The distance between cyclists and parked cars increased by approximately 200 mm
- ◆ The distance between cyclists and passing cars increased by approximately 600 mm
- ◆ The number of cyclists riding on the sidewalk reduced by 35%
- ◆ The amount of people riding in the wrong direction reduced by 80%.

It is noted that while different designs were assessed, the sharrow design (bike and chevron), as shown on the right of **Error! Reference source not found.**, was found to be more effective than the “bike in house” design.

### 2.1.2 Federal Highway Administration

In 2010, The Federal Highway Administration in the United States undertook an evaluation of Shared Lane Markings<sup>2</sup>. The previous research in the United States (San Francisco) concluded that the bicycle symbol and two chevrons, as per the right most symbol shown in **Error! Reference source not found.**, is the most effective symbol to indicate a shared lane.

This research assessed the effectiveness of sharrows in achieving the following goals:

- ◆ Indicate a preferred travel path for cyclists, away from parked vehicles
- ◆ Increase space between cyclists and passing cars
- ◆ Increase space between cyclists and the kerb and channel
- ◆ Promote “taking of the lane” where appropriate
- ◆ Increase space between parked vehicles and vehicles travelling in the lane, providing operating space for cyclists.

The research tested the use of sharrows in three different locations. The first location was approximately 3.0 m from the kerb outside a parking lane, done to test if the position of cyclists

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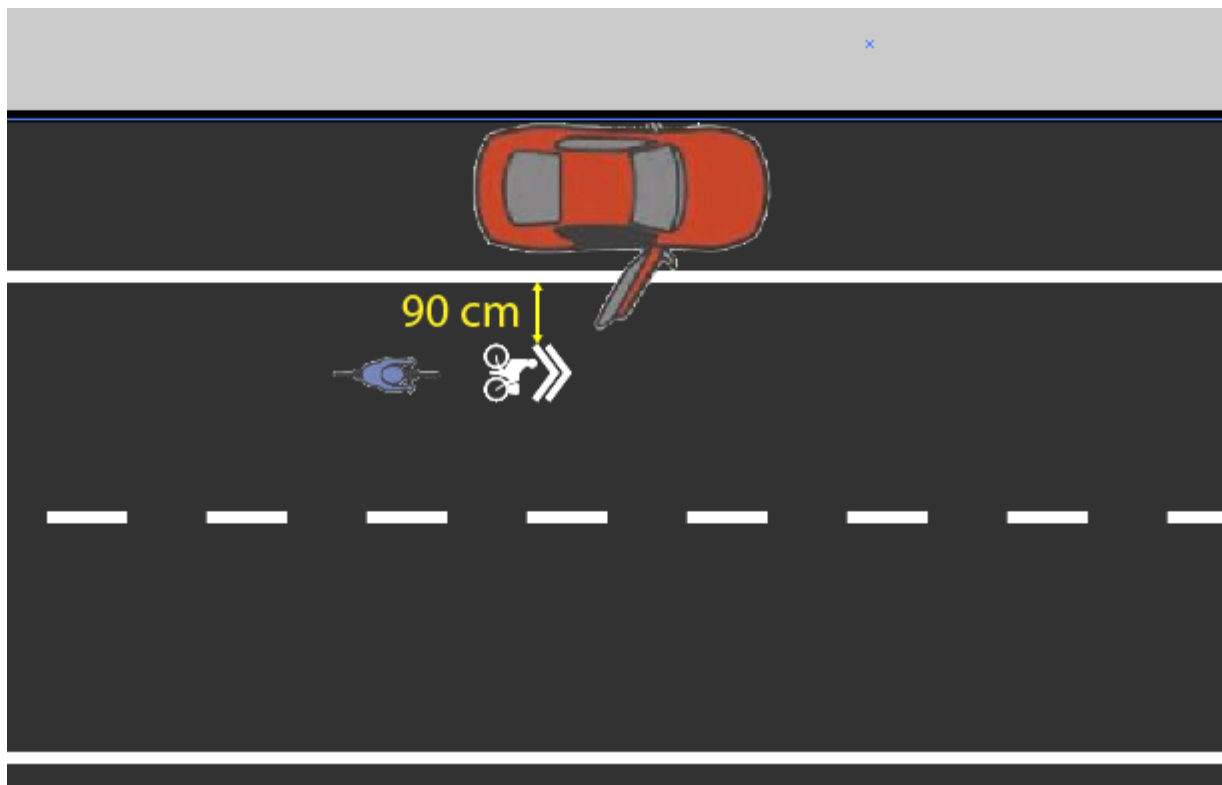
<sup>1</sup> San Francisco’s Shared Lane Pavement Markings: Improved Bicycle Safety, February 2004, Department of Parking and Traffic

<sup>2</sup> Evaluation of Shared Lane Markings, US Department of Transportation Federal Highway Administration, December 2010

outside the dooring zone would improve. The second location was on wide kerbside lanes, to test if cyclists would stay clear of the stormwater grates and to test if motor vehicles would give cyclists more space while passing. The third location was on a hill, where sharrows were located in the middle of the lane to encourage cyclists to claim the lane.

### 2.1.3 Case 1: Outside Parking Lane

Figure 3: Sharrows to keep cyclist clear of opening car doors



The results for the first case show that the percentage of cyclists cycling within the “dooring” range of parked vehicles reduced significantly, with 94% of the cyclists riding over the sharrow marking. While before the application of the sharrows, the percentage of cyclists taking avoiding measures to avoid a vehicle was 76%, in the after period, this dropped to 37%, indicating a more segregated traffic flow with less potential conflict. The research also shows that the spacing between vehicles in the travel lane and parked vehicles increased by approximately 360 mm. At the same time, the percentage of vehicles changing lanes to overtake a cyclist decreased from 12% to 3% after application of the sharrows.

The overall results of the research show that application of the shared lane markings resulted in a more segregated flow for cyclists and vehicles, giving the cyclists more operating space.

### 2.1.4 Case 2: Wide Kerbside Lane

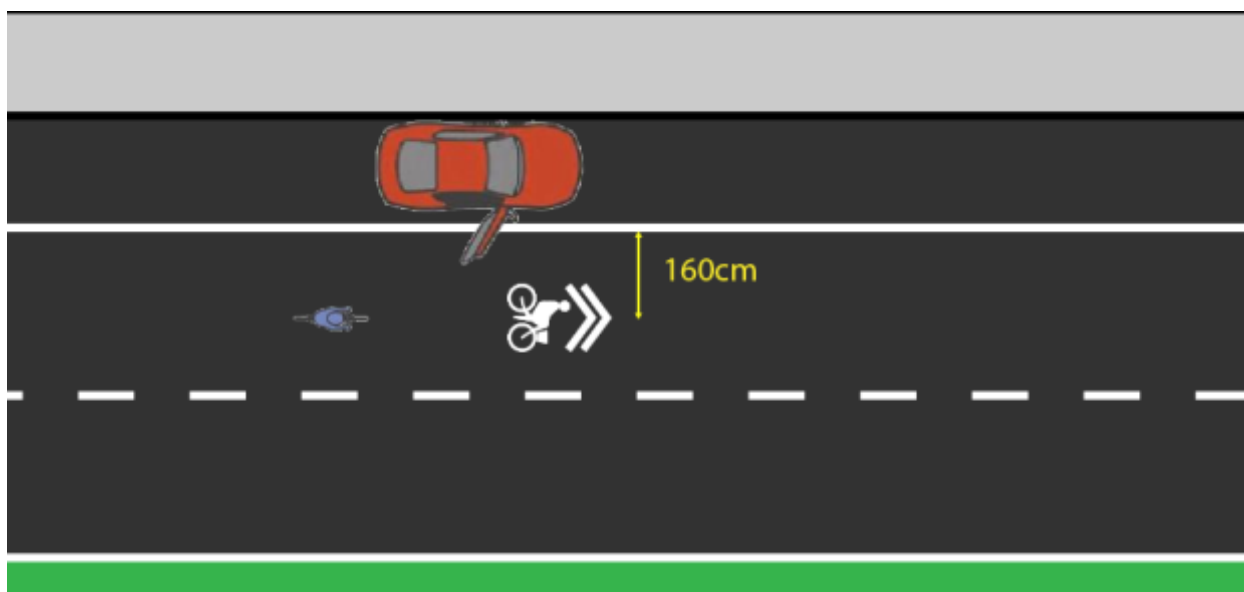
Figure 4: Sharrow to keep cyclist clear of kerb and channel



The results for the application of sharrows in a wide kerbside lane are less conclusive. While the separation between motor vehicles and the kerb increased by approximately 170 mm, the average separation between cyclists and passing motor vehicles actually decreased by approximately 70 mm. It is noted that while the separation decreased for cyclists travelling downhill, the separation between vehicles and cyclists travelling uphill actually increased slightly. The percentage of cyclists riding on the footpath decreased significantly, from 43% before the application of the sharrows, to 23% after. This indicates that cyclists feel more confident to ride on the road when sharrows are present.

### 2.1.5 Case 3: Claim the Lane

Figure 5: Sharrow to encourage claiming the lane on downhill section



The third case involves the application of a sharrow in a situation where cyclists should be encouraged to claim the lane. In this instance it involves a downhill section of road where cyclists gather enough speed to merge with general traffic. The sharrow is applied in the centre of 3.2 m wide the lane, approximately 3.7 m from the kerb.

After the application of the sharrow, approximately 15% of the cyclists rode over the sharrow, claiming the lane. 85% of the cyclists remained close to the edge of the sharrow. Surprisingly, the application of the sharrow had no noticeable effect on the position of the cyclists in relation to parked vehicles. Most cyclists were already outside the potential door zone, practically claiming the lane without actually riding in the centre of it. It is assumed that this is the reason for the lack of “success” with respect to this sharrow location.

### 2.1.6 Summary of Case Studies

Overall, the results from the evaluation research were positive. It found that applying shared lane markings reduces the number of people riding on the footpath by 25 to 35%. The separation between cyclists and parked vehicles increased by 80 to 100 mm. Most importantly, the distance between cyclists and cars in the vehicle lane while overtaking the cyclist increased by more than 600 mm which greatly improved (perceived) safety for cyclists.

## 2.2 Research from Australia

Vicroads has undertaken an evaluation of shared lane markings in Melbourne<sup>3</sup>. Three sites were evaluated, all on relatively quiet streets with a speed limit of 40-50 km/h. At two of the sites, the lateral location of cyclists shifted significantly towards the centre of the lane by up to 380 mm. At one site, the lateral position did not change significantly, with this lack of lateral shift partially attributable to the location of a pinch point at this site.

At one site, the number of cyclists travelling in the “door zone” reduced from 23 % to a mere 4 %, which is a significant reduction. At a second site, the percentage decreased from 62 % to 40 %. This indicates that sharrows do have a potential impact on the risk of “dooring” but their appropriateness needs to be assessed on a case-by-case basis.

The Australian research focused on the application of shared lane markings on slow-speed local roads where cyclists are encouraged to ride in the centre of the lane. Their recommendations include the use of sharrows at single lane roundabouts and on streets with parallel parking, but not enough width to provide a dedicated cycle lane. Sharrows should also not be used at greenfield developments and on roads where traffic volumes or vehicle speeds are such that sharing the lane becomes unsafe.

Another interesting conclusion from the Vicroads research is that sharrows are not suitable for wayfinding purposes because of the lack of destination information and distances. It could also dilute the original message of sharing the road.

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<sup>3</sup> Evaluation of Shared Lane Markings for Cyclists, VicRoads, February 2013

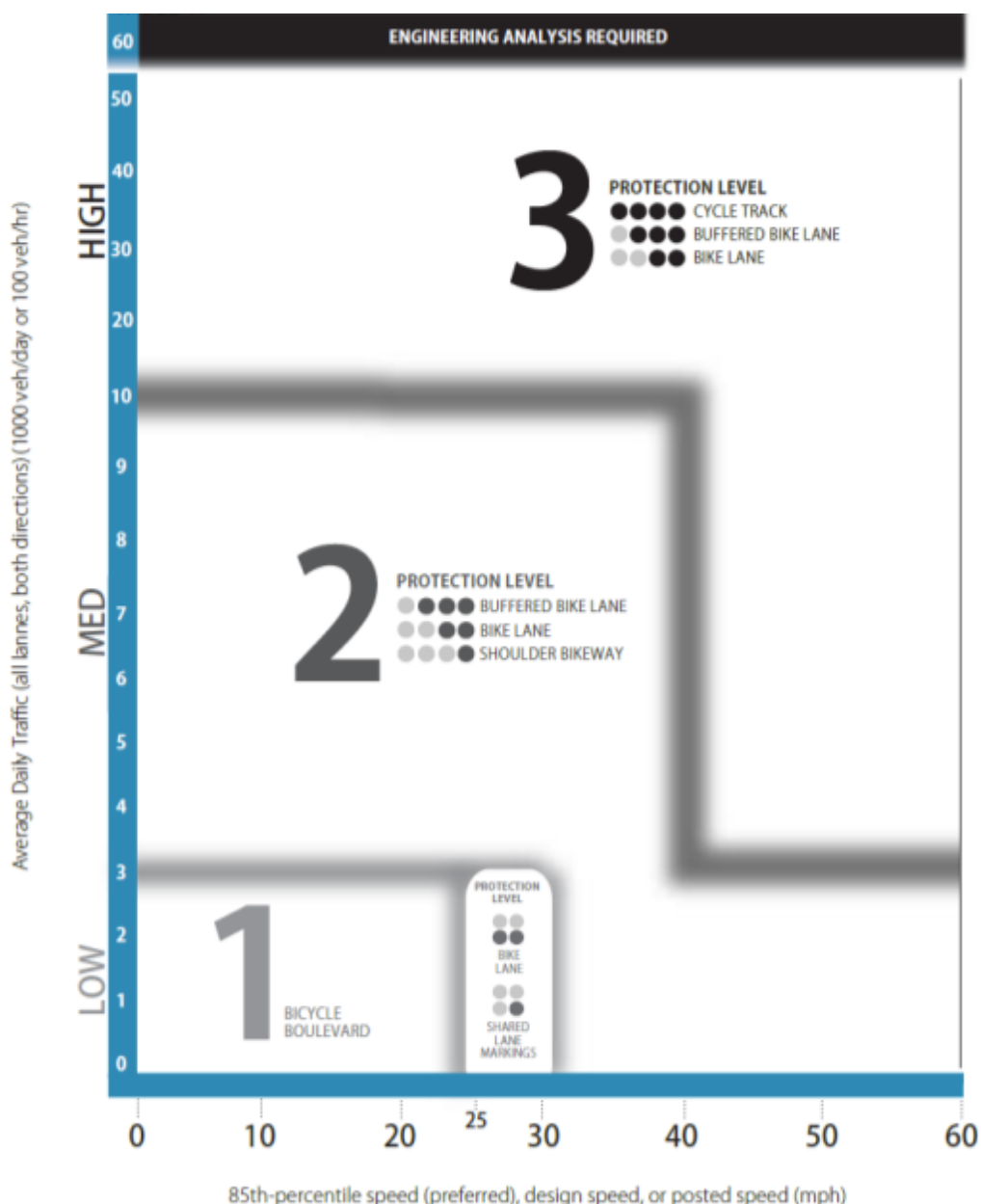
### 3 RECOMMENDED USE OF SHARED LANE MARKINGS

The need for a shared lane marking within the NZ context has arisen due to the need to try and provide an additional “toolbox” measure to help in the design of infrastructure. As evident in the above review, internationally the use of shared lane markings has, on the whole, proved successful in improving safety, wayfinding and awareness of cyclist routes.

The purpose of a shared lane marking, or sharrow, is to indicate a shared lane environment for cyclists and motorists. The presence of sharrows increases the visibility to motorists that the carriageway is a valid place for cyclists to travel, reinforcing to the motorist to act accordingly. Sharrows also help to position cyclists on the street, clear of hazards such as car doors, stormwater grates and such like and can be used as part of a wayfinding strategy to mark routes for cyclists to use. The use of sharrows is typical where a separated facility may not be desirable or feasible.

Figure 6 demonstrates the type of cycle facility required dependent on the vehicle speeds and daily vehicle volumes. As these metrics increase so does the need to provide a separated facility. The use of shared lane markings sits at the lower end of the scale.

Figure 6: Bicycle facility decision guidance (Washington County Bicycle Facility Design Toolkit)



Based on the leanings of the overseas examples there are a number of application themes that can be identified with regard to where shared lane markings may be applicable in the context of the Auckland road network, as well as nationally.

The primary characteristics for the use of shared lane markings on a route are:

- ◆ low vehicle volumes
- ◆ low vehicle speeds
- ◆ the operational characteristics of the carriageway, including the available width ,terrain and vehicle composition.

To achieve these measures it may be necessary to complement shared lane markings with treatments that optimise a particular route for cyclists. Treatments can include traffic calming measures to both

slow and/or remove vehicles from the corridor, signage, and intersection crossing treatments – all of which are aimed at providing a safe and convenient route for cyclists of all confidence levels

Other matters that require consideration when determining the applicability of using shared lane markings for a particular route include:

- ◆ logical, direct, and continuous routes that are well marked and signed
- ◆ provide convenient access to desired key destinations such as local schools, parks, shopping areas, public transport interchanges and community facilities
- ◆ provide cyclists minimal delay or disruption as they travel the route
- ◆ comfortable and safe crossings for cyclists at major intersections

Within the context of the Auckland region it is therefore recommended that shared lane markings be primarily used on the cycle feeder routes. The cycle feeder routes are typically not suitable for exclusive cycle lanes largely due to the residential nature of many of the cycle feeder routes, but also due to the typically low traffic volumes along these roads. However the use of shared lane markings will help to provide a complete network when paired with the cycle highways and cycle connectors – both of which are anticipated to accommodate cyclists in a more dedicated facility, whether it be on road or off road.

There may be the opportunity to use shared lane markings on other “busier” roads, but care should be taken to ensure the cyclist is not put into a dangerous position. It must always be remembered that a shared lane marking is seeking to reinforce the sharing of a carriageway between a cyclist and a vehicle. It may also promote the cyclist further into the carriageway, which in situations of high traffic volumes and speeds may be less than desirable.

### 3.1 Installation of Shared Lane Markings

This will primarily be dependent on the carriageway configuration and width where the shared lane markings are to be implemented. Some of the following matters should be considered:

- ◆ Corridors identified for the implementation of shared lane markings should be selected within the scope of a comprehensive transportation plan for a corridor or neighbourhood rather than focusing on a single street or corridor. This will help to avoid unexpectedly redirecting excessive vehicle traffic onto other local streets. It will also ensure the “network” as a whole is considered and a continuous, well thought out route can be developed
- ◆ Ideally, a route determined for shared lane markings should be located parallel to an arterial route in order to offer commuters who are less confident somewhere safe to cycle. As a result, if the street network is grid-like, the shared lane marked route does not offer any significant detraction away from the arterial route with respect to additional travel time or distance travelled

Along a route

- ◆ Install shared lane markings just after each intersection and in intervals of approximately 50 m
- ◆ Install near high volume cross roads, driveways or other conflict points to alert drivers.

- ◆ The marking material should ensure adequate skid resistance and retro-flexivity – consequently the use of glass bead is likely to be necessary
- ◆ The location of a sharrow on a carriageway should ensure that cyclists, if travelling over the sharrow, are clear of any dooring issues. Assuming on street parking widths of 2.0 m this suggests the sharrow should be located to ensure the cyclist is at least 2.9 m from the kerb

Figure 7 illustrates a photomontage of how a shared lane marking may look when applied to a local street in Auckland. As shown, the shared lane marking is located to the right of the on street parking, encouraging cyclists to ride outside of the “door strike” zone.

**Figure 7: Photomontage of shared lane markings on local streets (Brentwood Avenue, Auckland)**



## 4 IMPLEMENTATION OF SHARED LANE MARKINGS – NZ CONTEXT

There are a number of matters that require further consideration with respect to the implementation of shared lane markings in NZ. The need to understand the legality of such a marking, coupled with how it affects the existing legislation with respect to cycle lanes is a key matter to be resolved. The following provides further analysis of the existing legislation, as well as offering options as to how shared lane markings could be implemented in NZ.

### 4.1 Land Transport (Road User ) Rule 2004

The Road User Rules 2004 provide the following interpretations:



- ♦ *cycle lane* means a longitudinal strip within a roadway designed for the passage of cycles
- ♦ *special vehicle lane* means a lane defined by signs or markings as 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

## 4.2 Traffic Control Devices Manual 2004

The Traffic Control Devices (TCD) manual provide guidance on industry good practice, including, where necessary, practice mandated by law in relation to the use of traffic control devices.

Of particular importance to the use of a shared lane marking are the following excerpts from the TCD Manual

### **Purposes of markings**

*A marking has one of the following functions:*

- (a) 'regulatory', that is, it instructs road users by requiring or prohibiting specified actions in using a road;*
- (b) 'warning', that is, it informs road users of permanent hazards on a roadway or gives advance notice of features on or near a road;*
- (c) 'advisory', that is, it provides road users with information or guidance in the intended use of the road.*

### **Special vehicle lanes**

*If defining a part of a road as a special vehicle lane, a road controlling authority must, at the start of the special vehicle lane and at the point at which the lane starts again after each intersection:*

- (a) mark on the road surface a white symbol, that complies with [Schedule 2](#), defining the class or classes of vehicle for which the lane has been reserved; and*
- (b) if for other than a 24-hour restriction, install a special vehicle lane sign that complies with Schedule 1:
  - (i) defining the class or classes of vehicle for which the lane has been reserved; and*
  - (ii) stating the periods for which the reservation applies.**

*A road controlling authority may provide the following traffic control devices to discourage use of a special vehicle lane by other vehicles, or to draw attention to the likely presence of vehicles entitled to the use of the lane:*

- (a) additional white special vehicle lane symbols described in 11.2(1)(a) or signs described in 11.2(1)(b) along the length of the lane; or*
- (b) if for a 24-hour restriction, special vehicle lane signs; or*
- (c) a surface treatment that provides a contrasting colour or texture to that of adjacent lanes used by other vehicles:
  - (i) at locations along the length of the lane; or*
  - (ii) along the length of the lane**

On that basis and in the context of dedicated on-road cycle lanes, these lanes are identified by

- ♦ A white cycle symbol at the beginning of the lane,

- ◆ Signage is required **IF** the cycle lane restriction does not apply 24 hours.
- ◆ Additional white cycle symbols, signage and or surface treatments are optional along the length of the lane.

It is worth noting that the TCD does specify that a road marking can have a regulatory, a warning or an advisory function. In the case of special vehicle lanes, the function of the marking is clearly regulatory.

### 4.3 Manual of Traffic Signs and Markings (MOTSAM)

According to MOTSAM a cycle lane is denoted as follows:

- ◆ *Shall* have a cycle lane symbol
- ◆ *Should* be marked on the right hand side by a continuous white line
- ◆ Where parking is provided, the left hand edge of the cycle lane *should* be marked

If adopted, it will be necessary to add a shared lane symbol to the NZTA MOTSAM. MOTSAM part 2 specifies the currently permitted road markings, and its inclusion in MOTSAM will ensure consistency across the country.

## 5 POTENTIAL SHARED LANE MARKING DESIGN SOLUTIONS

As the existing cycle symbol is detailed within New Zealand's Traffic Control Devices (TCD) rule, any misuse of the existing cycle symbol may result in legality issues with the Land Transport Act 1998. That is, the current cycle symbol denoted within a cycle lane legally means this lane becomes a special vehicle lane, and is not able to be used by motorists, hence giving the ability for any illegal use to be enforced.

That being the case, simply replicating the cycle symbol as part of a shared lane marking would render the road a special vehicle lane, meaning only cyclists could use the road, with any motor vehicles being illegal.

However, there is a suggestion nationally that there may be a need to review the legislation to seek to change this and allow the cycle symbol to be used for a broader range of measures.

To that end the following explores potential solutions that could be used in NZ to resolve and/or avoid the issue of the legal cycle symbol.

### 5.1 Amendments to TCD Rule

To mitigate the potential issue of implementing a shared lane symbol that could resemble the existing cycle symbol, a change to the existing TCD rule regarding the use of cycle symbol could resolve the issue.

The following solutions have been developed based on:

- ◆ Easily identifiable design for its intended use.
- ◆ Similarity with existing special vehicle lane markings

- ◆ The need to ensure the solution can be practically implemented to existing infrastructure.

### 5.1.1 TCD Change Option 1: Inclusion of an Edge Line as a Legal Requirement

The identification of a cycle lane could be reinforced further by seeking the requirement for a cycle lane to have a white edge line along its extent – with this requirement being incorporated into the TCD Rule. If this were to become a requirement, all other special vehicle lanes will also be subject to this change, unless the cycle lane is completely separated from the special vehicle lane status

In a brief review of existing special vehicle lanes it would appear that the use of an edge line alongside bus and transit lanes is already “best practice” in terms of design.

**Photograph 1: Shakespeare Road Transit Lane**



**Photograph 2: Symonds Street Bus Lane**



MOTSAM identifies the design requirements for a cycle lane, with the wording “shall” and “should” used to identify features that must be installed and those features which are recommended have. As it currently stands a cycle lane shall have a cycle lane symbol, and should have edge line markings.

By re-wording the “should” to “shall” the use of edge line markings would then become a requirement with respect to the marking of a cycle lane, offering up an additional design feature that must be included for a cycle lane to be legally enforceable.

Best practice cycle lane design typically includes edge lines alongside the cycle lane, so making such a change to the TCD Rule would not have a considerable effect on the existing cycle lane infrastructure.

### 5.1.2 TCD Change Option 2: Cycle “Only” Symbol

This option for a change to the TCD rules suggests the adaptation of the font “ONLY” to supplement the existing cycle symbol to denote a cycle lane. This could be retrofitted to existing cycle lanes.

Figure 8: Cycle Only Symbol



The advantages and disadvantages of this symbol are summarised as follows:

Table 1: Cycle Only Symbol

Advantages:	Disadvantages:
<ul style="list-style-type: none"><li>The implementation of “Cycle Only” symbol would align with existing special vehicle lane</li></ul>	<ul style="list-style-type: none"><li>Proposed change would require the remarking of all on-road cycle networks within New</li></ul>

<p>markings such as ‘Bus Only’ symbol</p> <ul style="list-style-type: none"> <li>• Easily retro fitted within existing cycle network and infrastructure</li> <li>• Easily recognised by general public and road users</li> </ul>	<p>Zealand.</p> <ul style="list-style-type: none"> <li>• Retro fitting of “ONLY” font may not be aesthetically sound on existing colour treated surfaces.</li> </ul>
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### 5.1.3 TCD Change Option 3: Installation of Signs

This option for a change to the TCD rule change suggests the removal of the existing cycle symbol road marking’s regulatory status and replacing it with the requirement of signage installation.

The advantages and disadvantages of this option are summarised as follows:

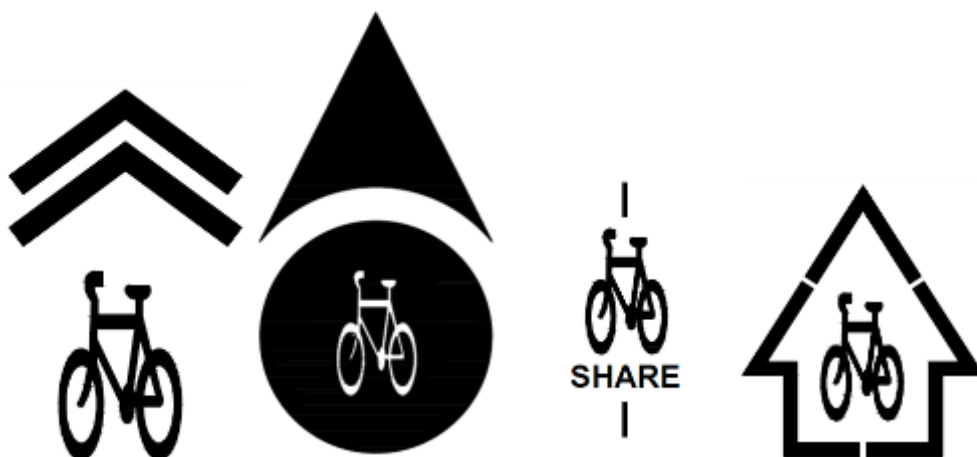
**Table 2: Installation of Signs**

<b>Advantages:</b>	<b>Disadvantages:</b>
<ul style="list-style-type: none"> <li>• The implementation of cycle lane signage would be aligned with the existing requirements to sign shared paths</li> <li>• Easily retro fitted within existing cycle network and infrastructure</li> <li>• There will be no significant visual difference to existing layout. (given all existing road markings are to be retained)</li> </ul>	<ul style="list-style-type: none"> <li>• Proposed change would require the installation of signs to all on-road cycle networks within New Zealand.</li> <li>• Costly in terms of the additional signage requirements</li> <li>• In urban areas, the quantity of repeater signage would result in signage cluster, reducing effectiveness of all signage within the road corridor.</li> <li>• Where a cycle lane is situated alongside on street parking, enforcement could be difficult as the cycle lane is offset from the kerb.</li> </ul>

### 5.1.4 TCD Change Option 4: Introduction of a new shared road marking symbol

The introduction of the new shared lane marking into legislation, while retaining the existing cycle symbol regulatory status, offers another option to address the TCD Rules. The shared lane marking typically involves a cycle symbol and some form of supplementary markings to denote direction of travel, or the desire to “share” the road, as demonstrated in Figure 9.

**Figure 9: Potential Shared Lane Marking Symbols**



Although the use of the bike symbol within a shared lane marking may conflict with the existing cycle symbol listed in the TCD rule, one may argue the difference in its overall appearance, such as the chevron add-ons, and the lack of edge lines justifies the shared lane marking in its entirety as a different symbol.

The advantages and disadvantages of this symbol are summarised as follows:

**Table 3: Potential Shared Lane Marking Symbols**

Advantages:	Disadvantages:
<ul style="list-style-type: none"> <li>Existing cycle infrastructure would remain legally enforceable with no changes required.</li> <li>eliminate potential road user confusion caused by the change of cycle lane display</li> <li>zero additional physical works required hence the most cost effective</li> </ul>	<ul style="list-style-type: none"> <li>Potential conflict with existing TCD rule in relation to cycle symbol.</li> </ul>

With respect to the introduction of a new shared lane marking, there is the potential for such a symbol to be adopted as an advisory symbol.

The risk of this option is the potential conflict with the current regulatory legality of the cycle symbol as specified in the schedule of markings in the TCD.

Although the use of the cycle symbol within the shared lane marking may conflict with existing cycle symbol listed in the TCD rule, one may argue the difference in its overall appearance such as the chevron add-ons and the lack of edge lines alongside a shared lane marking justifies the shared lane marking in its entirety as a different symbol.

The TCD manual currently does not contain any approved advisory symbols, but instead refers to the Manual of Traffic Signs and Markings (MOTSAM). Inclusion of the shared lane marking in the Traffic Control Devices Manual would therefore be unnecessary. Approval should be sought for inclusion of the shared lane marking as a new symbol in MOTSAM.

## 6 NEW SHARED LANE MARKINGS

Following on from Section 5.1.4 the introduction of a new shared lane marking symbol has been further explored with respect to the type of cycle symbol to be used as well as the overall design of the symbol.

The following symbols have been developed based on:

- ◆ The types of symbols used overseas and those that have proven to be successful through international research
- ◆ The ability for the symbols to be used for wayfinding
- ◆ The need to ensure the symbol can be clearly recognised and understood – hence we have maintained a cycle symbol throughout.
- ◆ Each of the designs has a form of a cycle symbol and some sort of directional element. This alerts drivers to the fact that it is a cycle route, and it serves as a wayfinding tool for cyclists.

Three options have been identified for the cycle symbol part of the overall shared lane marking.

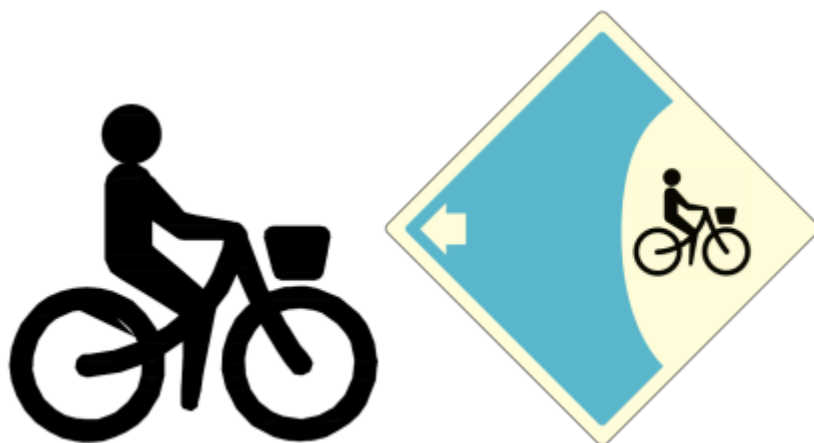
### 6.1 Potential Cycle Symbol Options

#### 6.1.1 Cycle Symbols 1:



This is existing symbol for a cycle lane. A strong advantage of retaining this symbol is that this is a generally recognised symbol and its use within share lane markings is well practiced within Australia. However, its use might create legal implication with New Zealand's current TCD rules as well as confusing road users as to the legal status of the lane.

### 6.1.2 Cycle Symbol 2:



The second option is an adaptation of the cycle symbol as used on the “Great Urban Rides” sign. This symbol will be recognised by experienced cyclists in Auckland. It shows an upright cyclist with a basket on the bike. This could be an appropriate symbol for the message that it is trying to convey, as it is likely that these symbols will be used on quieter streets, more suitable for inexperienced cyclists.

### 6.1.3 Cycle Symbol 3:



The third option is the cycle lane symbol as used in the United States. While this symbol is different from the cycle lane symbol as used in New Zealand, the symbol itself is unfamiliar and is considered less obvious than the other two options.

## 6.2 Symbol Design

Four design options have been investigated with the advantages and disadvantages of these discussed as follows



### 6.2.1 Design Option 1:



The first option consists of a cycle symbol within a circle, with an arrow above it indicating the direction of the preferred cycle route. There is the ability for the arrow to rotate about the symbol in order to indicate where a cycle route may deviate.

The advantages and disadvantages of this symbol are summarised as follows:

**Table 4: Design Option 1**

Advantages:	Disadvantages:
<ul style="list-style-type: none"> <li>Typically installed as a small symbol, cheaper to apply</li> <li>Good for wayfinding as the arrow can rotate to match the direction of travel</li> <li>Can be applied to narrow streets as well as the overall size of the symbol can be kept relatively small</li> </ul>	<ul style="list-style-type: none"> <li>Hard to identify for all road users in particularly drivers given its relatively small size</li> <li>More maintenance required due to smaller size</li> <li>Expensive if applied in a larger size</li> <li>Not easy to identify as “share the road” message</li> <li>Case studies shows cyclist will be less inclined to cycle over the centre of the symbol, less effective in preventing dooring accidents.</li> <li>Harder to spot, so more symbols needed for wayfinding purposes</li> <li>Intensive “paint” design may result traction issue if low skid resistance material is used.</li> </ul>

### 6.2.2 Design Option 2:



The second option consists of a cycle symbol with a line marking above and underneath, with the word “SHARE” just below.

**Table 5: Design Option 2**

Advantages:	Disadvantages:
<ul style="list-style-type: none"> <li>• Straight line can convey preferred path for safe cycling out of “door zone”</li> <li>• The word “SHARE” makes it easier to understand the message for drivers and other road users</li> <li>• Ability to supplement with a directional arrow if shared route deviates</li> </ul>	<ul style="list-style-type: none"> <li>• The cycle symbol along with its directional line can be confused for the cycle lane symbol and its delineation</li> <li>• The word “SHARE” will have to be fairly large to be read by drivers travelling at speed</li> <li>• The use of a word is less ideal than merely a symbol</li> <li>• More complex symbol, more prone to wear, higher maintenance costs</li> <li>• Might be less comfortable to ride across for cyclists</li> <li>• Continuous line marking connecting each symbol may result traction issue if low skid resistance material is used.</li> </ul>

**6.2.3 Design Option 3:**



An adaptation of the “Bike in house” design this uses the three cycle symbols. Depicts a cyclist within a larger arrow, indicating the preferred route and safe path for cyclist out of “door zone”

**Table 6: Design Option 3**

Advantages:	Disadvantages:
<ul style="list-style-type: none"> <li>• Clear directional symbol, easy for cyclists to find the preferred route</li> <li>• Can be located in the correct location for cyclists to stay out of “door zone”</li> <li>• Easily scalable for different uses and speeds</li> <li>• Looks less like a cycle lane</li> </ul>	<ul style="list-style-type: none"> <li>• Research shows that this symbol is not as effective as other symbols.</li> <li>• Might be confused with merely wayfinding arrow, no clear share the road message</li> <li>• May need to be modified for where a route may turn left or right, or be supplemented with a directional arrow</li> </ul>

### 6.2.4 Design Option 4:



This option consists of a cycle symbol with two chevrons located above it. This option has been widely adopted in the United States and Australia.

**Table 7: Design Option 4**

Advantages:	Disadvantages:
<ul style="list-style-type: none"> <li>• Research shows this option to be the most effective option for shared lane markings</li> <li>• Most cyclists will ride over the centre of the marking</li> <li>• Simple symbol, easy to identify</li> <li>• Scalable to suit different environments</li> <li>• Stencil and sizing for the cycle symbol already available</li> <li>• Symbol 1 is already used nationally</li> </ul>	<ul style="list-style-type: none"> <li>• May be confused with a cycle lane symbol</li> <li>• Might be confused with merely wayfinding arrow, no clear share the road message</li> <li>• May need to be modified for where a route may turn left or right, or be supplemented with a directional arrow</li> </ul>

## 6.3 Colour Options

Colour options for the symbol could suggest

- ◆ White as per other road markings
- ◆ Blue, similar to other tourist signage as indicated in MOTSAM
- ◆ Green, consistent with the existing cycle markings
- ◆ Yellow has been avoided as this typically denotes ‘permanent warning’ type matters

## 6.4 Summary of Shared Lane Marking Design

It is recommended that the existing cycle symbol be retained, and that this be supplemented with chevron arrow markings, as indicated in the first illustration of Section 6.2.4. The cycle symbol is easily recognisable given its current use within NZ. International research has also shown that the chevron type markings above the symbol to be the most effective option for a shared lane marking.

Based on the overseas examples, it is recommended that the symbol be painted white as this gives the greatest contrast on a black asphalt surface for a “stencil” type symbol.

## 7 SITES FOR INITIAL INSTALLATION

The Dominion Road Parallel Cycle Routes project has identified two routes running parallel to Dominion Road for the implementation of cycle infrastructure measures to encourage the use of these routes by less confident commuters, recreation cyclists and school children. The Western and Eastern Routes are both made up of a variety of roads, requiring cyclists to turn left and right at a number of intersections. It has been identified within the study that it is imperative that the routes be clearly marked for way finding. A vital part of the success of the routes is that cyclists can quickly and easily identify where they are heading next – whether that be continuing along the route or to stop at a key destination.

Cyclists on these routes will generally be travelling at speeds around 10 – 20 km/h. The way finding needs of a cyclist travelling at this speed are different to pedestrians who travel much slower, or car drivers who travel much faster. A cyclist's sight line alternates between the road in front of them, looking for potholes or debris that may cause a problem, and a point in the distance where a decision needs to be made (e.g. an intersection or parked car). As such traditional signage is not easily taken in by cyclists, particularly if it is positioned above head height.

Hence it has been recommended that these routes make use of shared lane markings in order to clearly define the routes for cyclists, as well as highlight the need for motorists to share the road with cyclists.

## 8 POTENTIAL DRIVER CONFUSION

Concerns have been raised about the possible confusion of the shared lane marking with the cycle lane symbol, raising uncertainty for vehicle drivers with regards to the legal status of the road. To indicate the visual difference between a cycle lane and the shared lane marking, the following mock-up has been produced. On the left hand side is an indication of what a cycle lane would look like in a regular suburban street. The image on the right hand side illustrates what the road layout would look like with shared lane markings in place.

**Figure 10: Photomontage of cycle lane vs. shared lane markings on local streets (Brentwood Avenue, Auckland)**

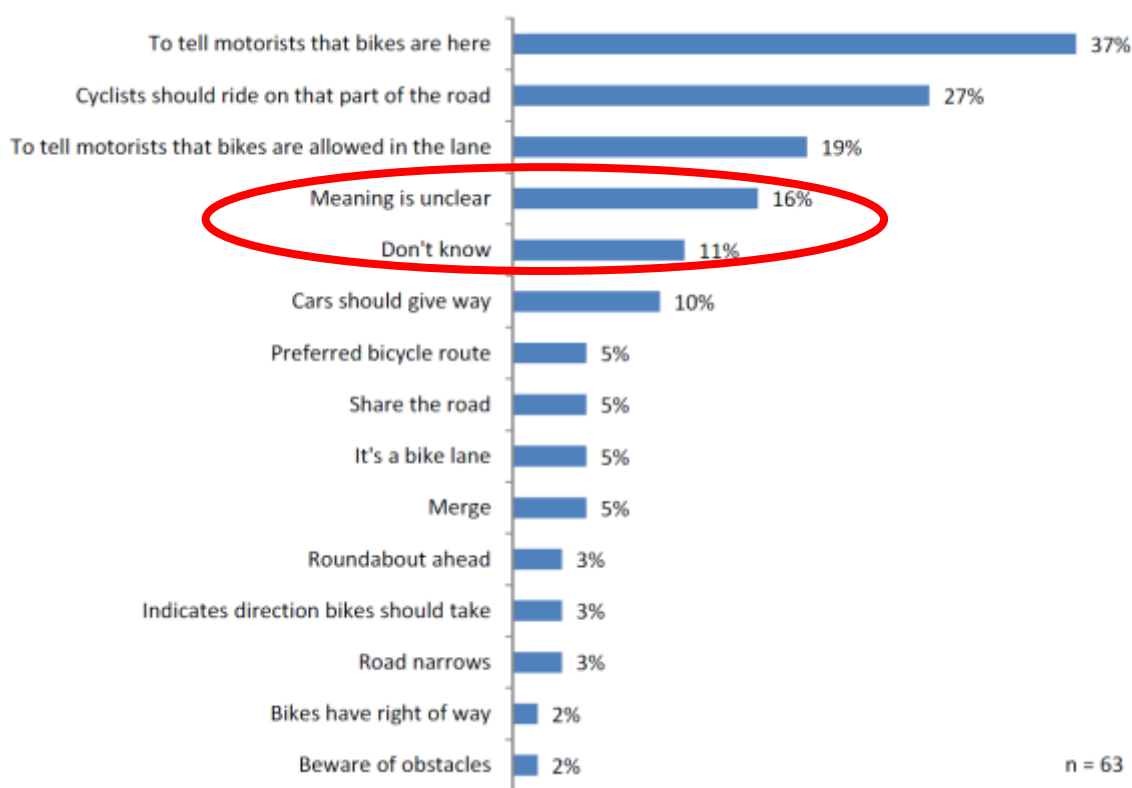


As can be seen from these images, while the cycle symbol is clearly visible in both, one of the visually defining design features of a cycle lane is the edge line on both sides of the symbol. The edge line clearly defines the space dedicated to cyclists and acts as a border that vehicles can not cross. This reinforces the suggestion to include an edge line as a requirement for a cycle lane.

In contrast, the shared lane marking lacks this delineation and should not be easily confused with a cycle lane. While the green surface treatment, shown on the left is optional, it is widely used in the Auckland region, reinforcing the status of the cycle lane. The lack of green surface treatment around the shared lane markings helps differentiate between the two.

Research undertaken in Australia to the perception of shared lane markings shows the following results:

**Figure 11: Meaning of shared lane markings according to cyclists (Vicroads 2012)**



These results show that only a very small percentage of the surveyed cyclists think the shared lane marking delineates a cycle lane. However, a noticeable percentage (27%) of the survey participants are unclear about the meaning of the markings. This shows that the problem is not so much with confusion over the meaning of the marking as it is with educating drivers and cyclists. Not many people assume the wrong meaning, but many people do not know the correct meaning of the marking.

## 9 EDUCATION, MARKETING AND COMMUNITY INVOLVEMENT

With the introduction of a new symbol to the road environment there will be a need to educate motorists and cyclists as to what the new symbol means, how to behave when travelling along these routes and what the intended goals are of marking such routes.

One of the key target audiences for the use of shared lane markings is less confident commuters, recreation cyclists and school children. With the implementation of shared lane markings to consider linking key destinations such as local schools, parks, shopping areas, public transport interchanges and community facilities there are a number of mechanisms for which to get community involvement and support for a new shared lane marking route. This could involve:

- ◆ a community cycle day along the route
- ◆ organising with local schools for cycling school buses to be implemented, with these initially supported by a confident cyclist
- ◆ Cycle skills training programme – utilise these routes for cycle training programmes to encourage less confident cyclists

Ideally there may be a number of regions about the country wishing to implement shared lane markings and a national campaign may be able to be launched. Alternatively if each region promotes the shared lane markings in a consistent approach then this will help “spread the message” without necessarily undertaking a nationwide campaign.

## 10 CONCLUSIONS

The need for a shared lane marking within the NZ context has arisen due to the need to try and provide an additional “toolbox” measure to help in the design of infrastructure. Internationally the use of shared lane markings has, on the whole, proved successful in improving safety, wayfinding and awareness of cyclist routes.

With respect to introducing a shared lane marking into NZ there are a number of matters that require further consideration. Namely these are:

- ◆ The need to understand the legality of such a marking coupled with how it affects the existing legislation with respect to the cycle lane symbol; is a key matter to be resolved.
- ◆ How the existing legislation could be altered if necessary
- ◆ The preferred design for a shared lane marking.

With respect to the design of the shared lane marking it is recommended that the existing cycle symbol be retained, and that this be supplemented with chevron arrow markings, as illustrated in Section 6.2.4. With the cycle symbol being the same as that used to denote a cycle lane (as per the special vehicle lane requirements of the TCD Rules) this therefore requires further consideration as to the legal implications.

A number of options have been investigated with respect to possible changes to the TCD Rule given the regulatory status given to the existing cycle symbol. Any changes to the TCD Rules will be need to be worked through nationally as the changes could affect all existing special vehicle lanes throughout the country.

The simplest solution to the TCD Rule could be to adopt a new shared lane marking as an advisory type marking. Although the use of the cycle symbol within the new shared lane marking may conflict with existing cycle symbol listed in the TCD rule, one may argue the difference in its overall appearance

such as the chevron add-ons and the lack of edge lines alongside a shared lane marking, justifies the shared lane marking in its entirety as a different symbol.

If it is concluded that the TCD Rule does need to be amended to reinforce the legal status of a cycle lane it is recommended that consideration be given to adopting an edge line as a requirement to denote a special vehicle lane. This is currently “best practice” for bus, transit and cycle lanes and hence would not appear to have any significant effect on the existing infrastructure.

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## **APPENDIX A**

## **international examples of sharrows**

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**San Francisco, California**



**Brisbane, Australia**



**Denver, Colorado**



**Cambridge, Massachusetts**



**Paris, France**



**Portland, Oregon**



**Gainesville, Florida**



**Berkeley, California.**



**Portland, Oregon**



**Minneapolis**



