ACT Government
Territory and Municipal Services

Cycle Separation Trial

Final Draft Report
2015

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ACT Government
Territory and Municipal Services

Introduction

In April 2014 the Minister for Territory and Municipal Services Directorate (TAMS), Shane Rattenbury committed to trial several devices aimed at improving the safety of cyclists by providing improved separation from vehicular traffic when cycling on road.

Roads ACT identified three (3) new cycling separation devices and nominated five (5) sites, where separation between on-road cyclists and adjacent traffic could be trialed. These sites were strategically nominated as trial locations to test different profile delineation devices.

The lack of awareness of on-road cyclists or conformance with the road rules demonstrated by motorists at these particular sites was identified via observations and records of complaints from the public. Different profile delineators were used at these sites, to clearly identify the edge lines and maximise the separation between on-road cyclists (using on road cycle lanes) and adjacent traffic.

The selected delineation devices were trialled at the following locations;

1. ***Tram Separator (Refer page 6)***
   – Athllon Drive on the approach to Scollay Street, Greenway.
2. ***Riley Kerb (Refer page** Error! Bookmark not defined.Error! Bookmark not defined.**8)***
   – Corner of Pialligo Avenue and Fairbairn Avenue.
3. ***Audio Tactile line marking (Refer page 11)***
   - London Circuit between Edinburgh Avenue and Constitution Avenue.
   - Vernon Circle between London Circuit and London Circuit over bridge.
   - Corner of Northbourne Avenue and Barton Highway.

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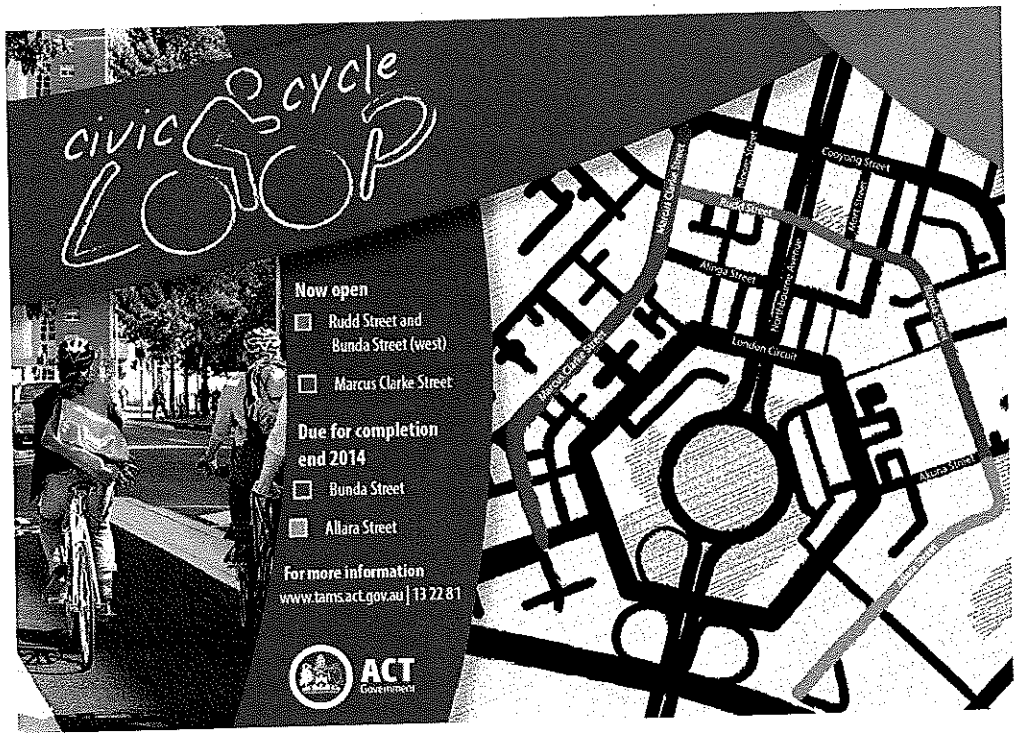
Background

Commuters are starting to shift to walking and cycling as their preferred modes of transport in the ACT, in high density areas. It is imperative to provide safe cycling facilities to encourage commuters in these locations and for them to enjoy what the region has to offer. These areas should be inviting for people to interact and linger using active travel options. Therefore, it is all the more important to place a high priority on 'on road cycling corridors.'

Roads ACT has an ongoing program for implementing and maintaining active travel infrastructure. As a part of this ongoing commitment, Roads ACT has trialled a number of treatments as measures to analyse the benefit of separation of cyclists and vehicles and as part of the ongoing program to observe if they help to improve cyclists safety. The Civic Cycle Loop is an example where the Territory successfully implemented a grade separated cycle lane, also referred to as a 'Copenhagen' style cycle lane.



The purpose of the cycle separation trial is to identify separation devices that best suit locations where there is a need for greater separation between cyclists and vehicles, such as narrow lane widths, bicycle/vehicle conflict points and higher speed limits areas of the road network.

Objective of the Cycle Separation Trial

The decision surrounding the cycle separation trial stemmed from the ACT Government's ongoing commitment to sustainable transport and safety/vision zero.

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The key objectives identified to achieve the desired outcomes were;

- Clear delineation of lanes
- Increasing real and perceived sense of safety
- Installation, life cycle & ongoing maintenance costs
- Ease of installation
- Cost effectiveness

Benefits of Greater Separation

Increased separation between on-road cyclists and adjacent traffic can provide many benefits. By increasing the physical distance between on-road cyclists and adjacent traffic, the real and perceived sense of safety for cyclists is increased and driver recognition of cyclists as a vehicle in the road environment is improved. This in turn encourages participation from the wider community. Evidence suggests that greater separation and an improved sense of safety increase participation from female and less-confident cyclists to actively commute and ride more regularly.

Benefits of increased community participation in cycling include:

- Reduced congestion to the road network
- Increased public health & related economic benefits
- A reduction in greenhouse gas emissions
- Improved quality of life

Public comments regularly raise the lack of safety on road cycle paths within the city. Comments have also shown a strong correlation between the quality of cycling facilities and less inclination to ride amongst cyclists. Hence, improving cycling infrastructure along the corridors within the city is likely to result in more female/less-confident cyclists using the network.

Devices and Locations

Three devices were selected to be introduced to the road network, at selected sites to compare their applicability to the site conditions, acceptance by drivers and cyclists, and their success in improving rider safety.

Please see Appendix *for information.*

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Device 1. Tram Separator

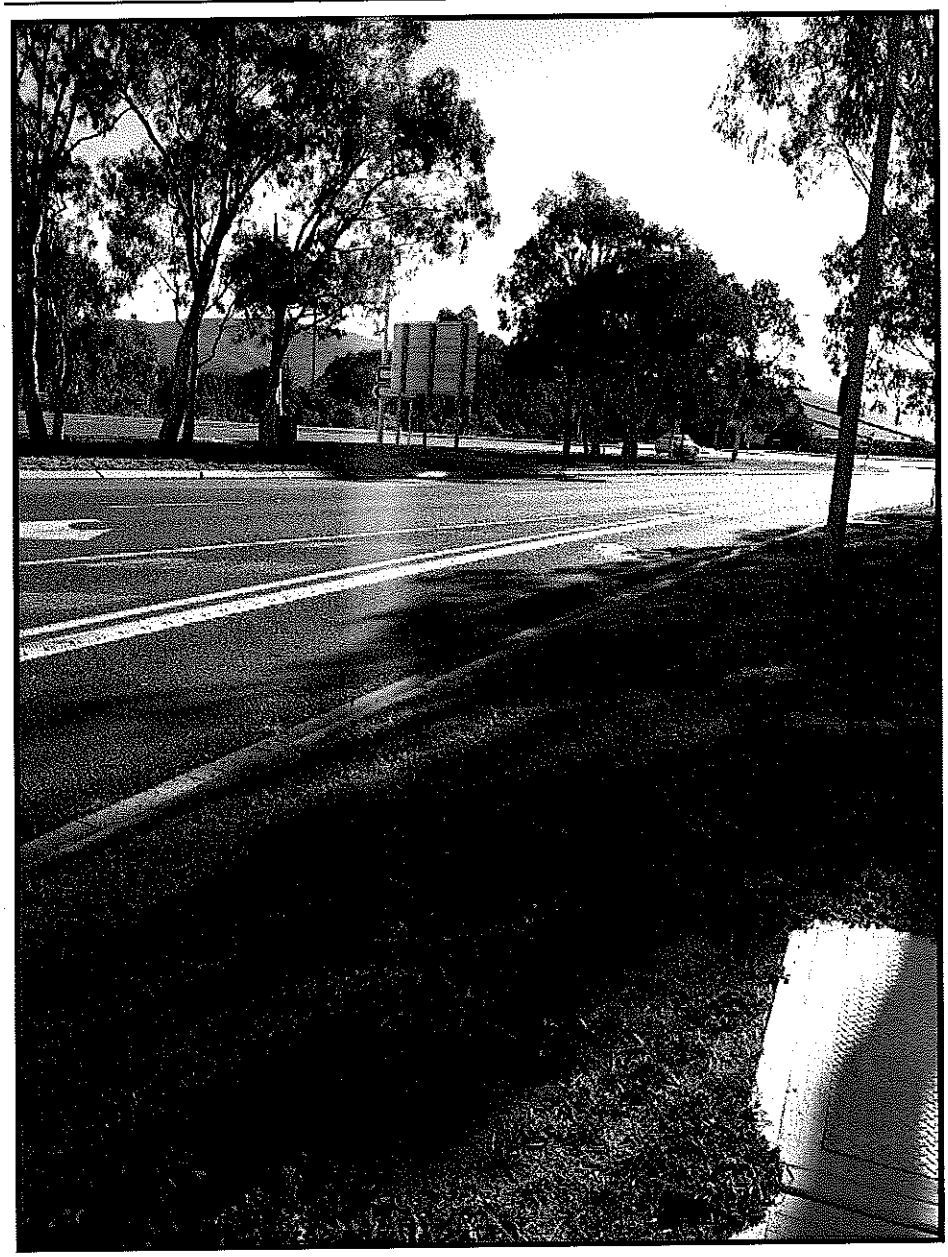

Figure 1. Tram Separator

Briefing statement

Device – Tram Separator

The Tram Separator is a continual profile rubber kerb. The purpose of the 'Tram Separator' is to physically delineate the on-road cycle lane. As the name suggests, this device is more commonly seen in cities where trams are commonplace such as Melbourne, Australia.

Location – Athllon Drive on the approach to Scollay Street

Athllon Drive is classified as an arterial road. The east bound carriageway experiences approximately 6,000 vehicle per day. The speed limit is 60 kph.

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Background

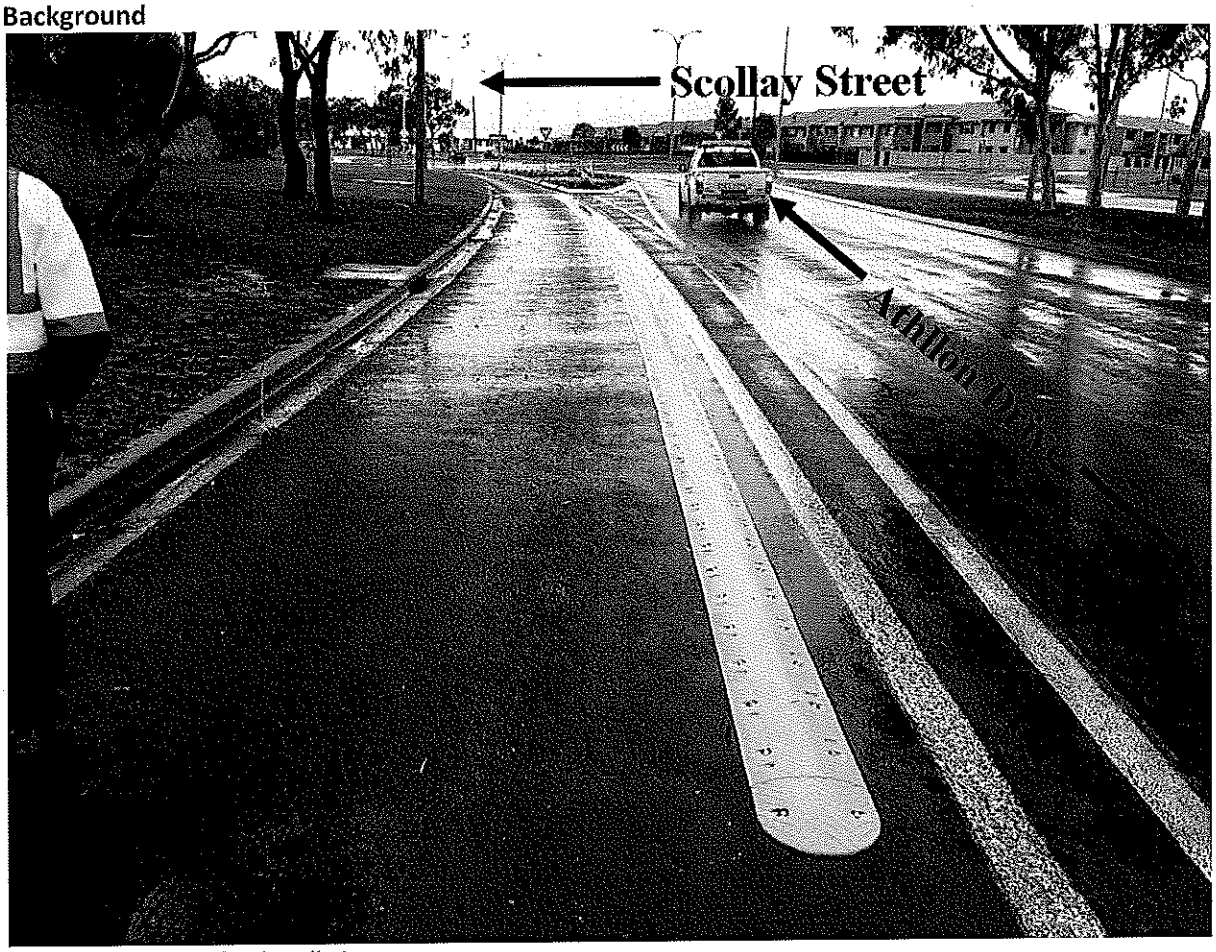

Figure 2. 12 months after installation

In addition to physically delineating the cycle lane, a tram separator was trialled at this location to deter motorists from using the on road cycle lane as a slip lane to turn onto Scollay Street.

Durability

During the 12 month period in which the devices were monitored, there were not any apparent damages to the device. This could be due to the low number of vehicles hitting the device in comparison to other trial locations, as the primary intention of this device was to minimise the number of vehicles using the cycle lane as a slip lane to turn onto Scollay Street.

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Device 2. Riley Kerb

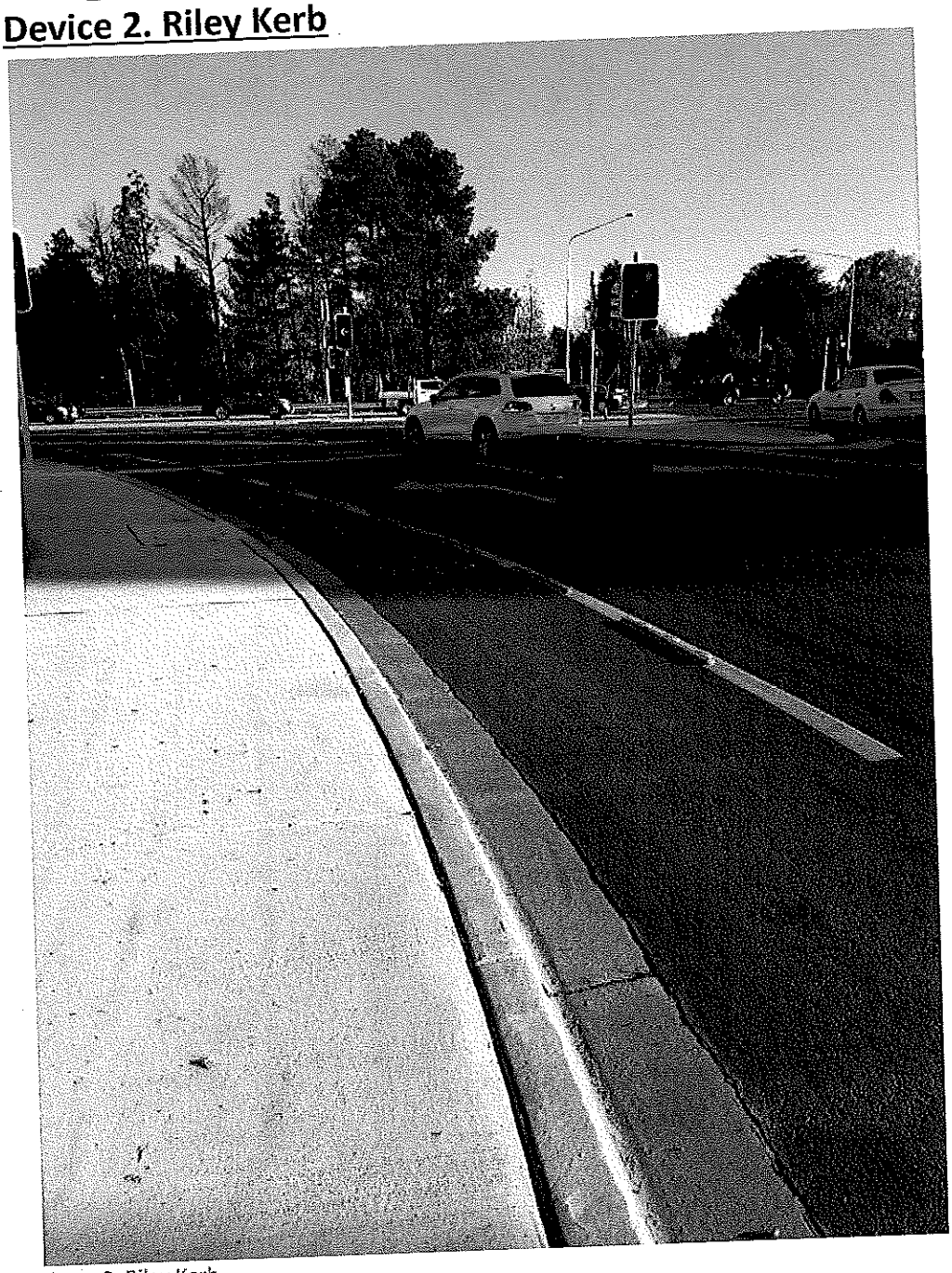

Figure 3. Riley Kerb

Briefing statement

Device

The Riley Kerb is a profile rubber kerb. The purpose of the 'Riley kerb' is to physically delineate the on-road cycle lane. Some strengths of the Riley Kerb device are that it can be placed intermittently to allow cyclists to enter and exit the cycle lane, and it allows water to pass through, addressing any drainage requirements.

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Location – Pialligo Avenue and Fairbairn Avenue

The left turn from Fairbairn Avenue to Pialligo Avenue experiences approximately 2,500 vehicles per day. Many of these are heavy vehicles, as both roads are encased in commercial/industrial zones. Both Fairbairn Avenue and Pialligo Avenue are classified as arterial roads. The speed limit on both Fairbairn and Pialligo Avenue is 80kph.

Background

Figure 4. 12 months after installation

Riley kerb was trialled at this location due to the high proportion of motorists encroaching onto the cycle lane as they make a left turn from Fairbairn Avenue to Pialligo Avenue, and due to a large proportion of these vehicles being heavy vehicles.

Durability

During the 12 months that the devices were monitored, noticeable discolouration due to rubber markings from vehicle tyres was apparent.

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Riley Kerb

Figure 5. 12 months after installation

There were not any significant damages to the device, apart from some experiencing loose bolts. This could be due to the high proportion of heavy vehicles encroaching onto the cycle lane when making a left turn onto Pialligo Avenue, driving over the devices.

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Device 3. Audio Tactile Line Marking (ATLM)

Figure 6. ATLM

Briefing statement

Device

Screed applied audio tactile thermo plastic line marking commonly referred to as "rumble strips" - is used to provide an audible and vibratory alert to motorists. Similar to rumble strips used on highways to target driver fatigue, these devices alert the driver if they encroach onto the adjacent cycle lane. The line marking consists of a 2mm thick continual base and an intermittent 8-10mm raised profile. Unlike other devices, rumble strips do not use any additional road space, as it is applied over the existing line marking. This profile allows cyclists to enter and exit the lane as they please, whilst allowing water to flow over as designed. Rumble strips contain glass beads in the thermoplastic for added reflectivity across the line marking for delineation at night.

Location 1 – London Circuit (London Circuit between Edinburgh Avenue and Constitution Avenue (both sides)

London Circuit is classified as an arterial road and experiences approximately 4,500 vehicles per day. Additionally, the eastbound carriageway is a "rapid' bus route into the city centre and thereby hosts many buses especially in the morning peak. The speed limit of London Circuit is 60kph.

Location 2 – Vernon Circle (Full length/both sides)

Vernon Circle acts as one of the main arteries into the city from south of Lake Burley Griffin and is classified as an arterial road. Vernon Circle services approximately 17,000 Vehicles per day. The sign posted speed limit is 60kph.

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Location 3 – Northbourne Avenue/Barton Highway

Approximately 6,000 vehicles utilise the North-West bound left turn slip lane of Northbourne Avenue onto the Barton Highway daily. This left turn slip lane is one of the main distributors from the City to the North of Canberra. Both the approach and the departure of the site is sign posted at 80 kph.

Background - Location 3 – Northbourne Avenue/Barton Highway

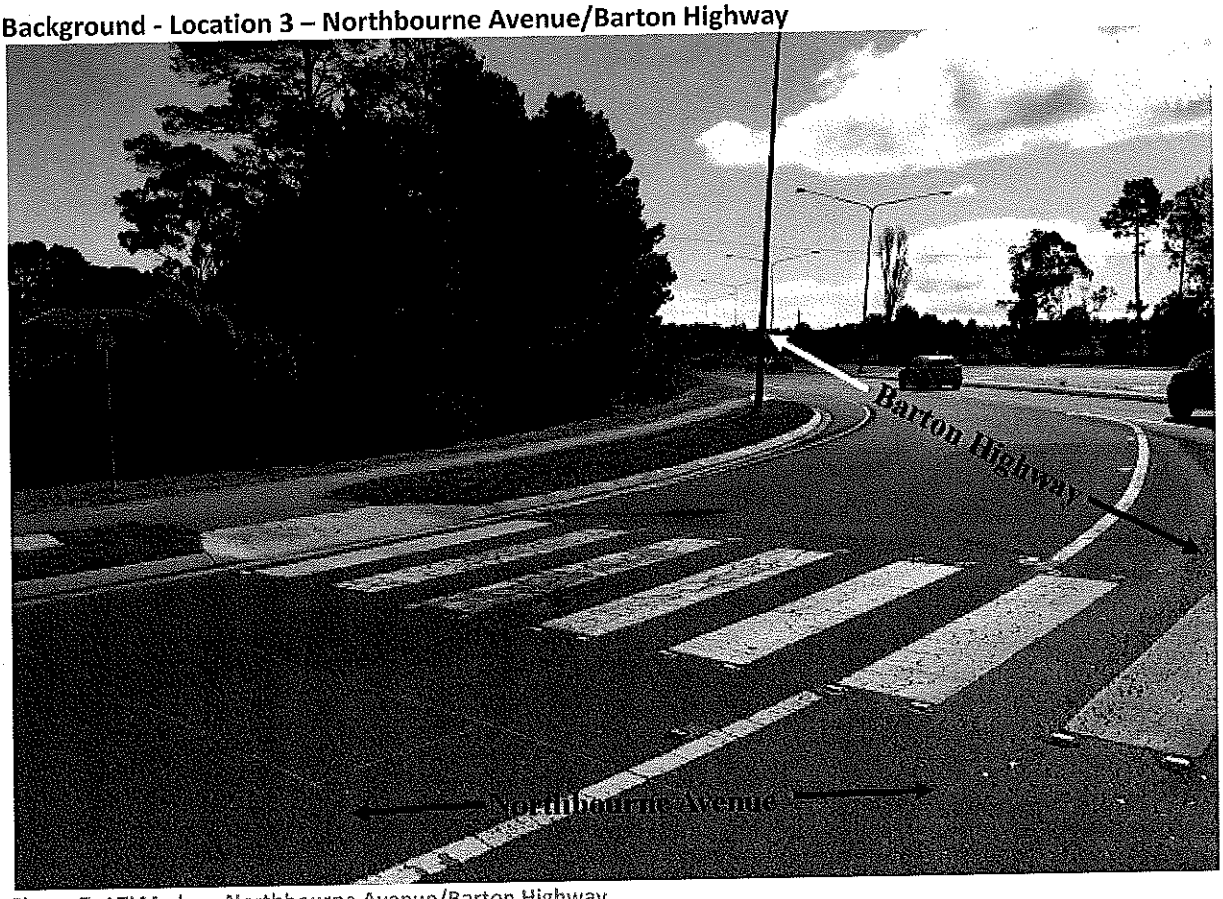

Figure 7. ATLM along Northbourne Avenue/Barton Highway

On road cyclists travelling northbound on Northbourne Avenue towards Barton Highway are directed off the on road cycle path, as there is no on road cycle lane along the slip lane.
ATLM was applied with the reintroduction of the on road cycle lane (Figure 7) to alert any distracted drivers of the cycle lane.

Durability

ATLM was the most susceptible to damage out of the 3 devices trialled.
Initially the ATLM was screed applied at all locations mentioned above. But, preformed ATLM layers were applied a month after the initial installation to areas that experienced high levels of delamination.

As shown in Figure 8, durability of ATLM decreased at screed applied thermoplastic areas compared to preformed thermoplastic. However, the costs associated with preformed were significantly greater than screed applied.

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Audio Tactile Line Marking (ATLM)

Figure 8. Screed applied ATLM – 12 months after installation

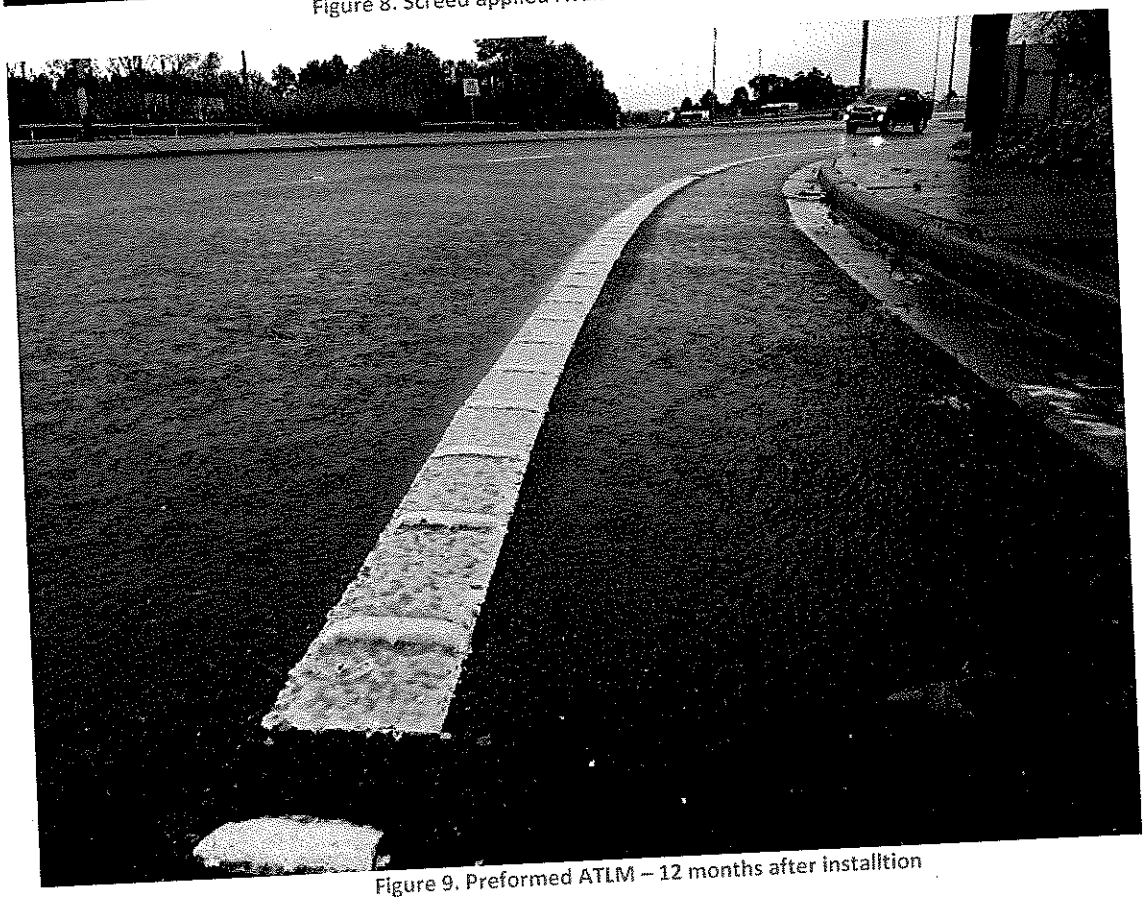

Figure 9. Preformed ATLM – 12 months after installtion

Methodology for Analysing the Performance of these Devices

This section of the report outlines the methodology used to monitor the lateral position of vehicles as they travel adjacent to the different cycling separation devices. The behaviour of motorists was monitored immediately upon installation, 6 months after the devices were installed, and a third time 12 months after installation.

The inspections were designed to observe the reactions of motorists and cyclists to the separation devices. Acceptance and rejection to the devices were gathered by regular observations and inspection of the damage to the devices.

Quantitative data sets were collected at the locations where Audio Tactile Line Markings (ATLM) were installed to identify trends and patterns, and to record the inspections and observations. The data was collected by monitoring and recording the number of vehicles (in the kerbside lane) that stayed within the vehicular lane or encroached onto the cycle lane at conflict points. The number of vehicles that encroached onto the cycle lanes were further broken down into two categories: whether the motorists reacted to the devices by correcting their drive path or continued on their initial drive path by encroaching into the bike lane.

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Observational Records

Tram Separator

During all of the inspections conducted as part of the cycle separation trial no vehicles were observed encroaching into the on road cycle lane at Athllon Drive on the approach to Scollay Street. The primary intention of this device (Tram Separator) was to minimise the number of vehicles using the cycle lane as a slip lane to turn onto Scollay Street. The device was successful in deterring motorists using the cycle lane as a slip lane. No complaints of this movement have been reported to TAMS since the installation of the trial devices.

Riley Kerb

During the 12 month period in which the riley kerb device was monitored, a significant proportion of heavy vehicles encroached onto the on road cycle lane. This is due to the tight turning circle as motorists make a left turn from Fairbairn Avenue to Pialligo Avenue. But, this device was effective in deterring passenger vehicles away from the on road cycle lane, whilst informing heavy vehicles of the on road cycle lane. An insignificant portion of passenger vehicles were observed hitting the device, during the inspections conducted.

Detailed assessments of the Tram Separator and Riley Kerb devices were not undertaken, as changes in driver behaviour was obvious during the initial observations in both cases. This is partially due to the specific location and issues the treatments were installed to address.

Detailed Results – (Audio Tactile Line Marking)

Out of all the sites inspected two were chosen for the purpose of this report. Counts were taken at London Circuit and Vernon Circle during the morning and afternoon traffic peaks. Note that, these counts are not representative of all trial sites, but provide a general snapshot of reaction of motorists to the Audio Tactile Line Marking (ATLM), showing similar trends and patterns.

A total number of 2706 vehicles were analysed at the time of writing this report. This included 2549 small vehicles and 157 heavy vehicles across the two different sites. A majority (67%) of the vehicles observed during this period remained within the vehicular lane. These motorists recognised the significance of the line marking devices and avoided them at the conflict points at the locations they were installed. A distinct increase in the separation between vehicles and separation devices was observed when cyclists were present in the adjacent bike lane.

Total vehicles									
	Total	Avoided	% avoided	Encroached	% encroached	Not reacted	% not reacted	Reacted	% reacted
Small vehicles	2549	1756	69%	793	31%	436	55%	359	45%
Heavy vehicles	157	52	33%	105	67%	89	82%	14	18%
Total vehicles	2706	1808	67%	898	33%	525	58%	373	42%

From the observational records, Audio Tactile Line Marking had a noticeable effect in deterring motorists from entering the on-road cycle lanes. The data is limited to counts taken immediately after installation, six months after installation, and a further 12 months after installation. These counts are by no means a representation of the effectiveness of separation devices on a whole, but rather reflect motorists' behaviour during the periodic observations after installation.

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As shown above in the table above, a lower reaction to cycle separation devices was visible amongst heavy vehicle drivers. This could be due to the drawback of being able to change their drive path alignments and the challenges of keeping the larger vehicles within the vehicular lanes.

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Detailed Results – (Audio Tactile Line Marking)

Upon Installation – April 2014

Total vehicles – upon installation									
	Total	Avoided	% avoided	Encroached	% encroached	Not reacted	% not reacted	Reacted	% reacted
Small vehicles	820	507	62%	313	38%	186	59%	127	41%
Heavy vehicles	61	22	36%	39	64%	33	85%	6	15%
Total vehicles	881	529	60%	352	40%	219	62%	133	38%

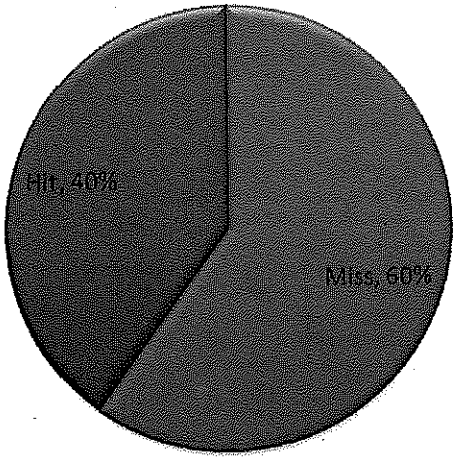

Figure 10. Total vehicles - upon installation

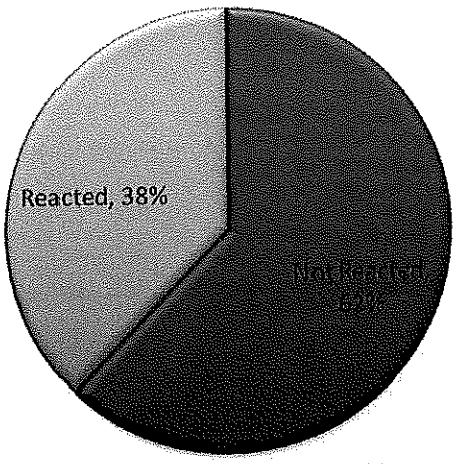

Figure 11. Whether motorists reacted after encroaching onto the cycle lane

Detailed Results – (Audio Tactile Line Marking)

6 Months After Installation

Total vehicles - 6 Months After Installation

	Total	Avoided	% avoided	Encroached	% encroached	Not reacted	% not reacted	Reacted	% reacted
Small vehicles	869	588	68%	281	32%	158	56%	123	44%
Heavy vehicles	53	14	26%	39	74%	33	85%	6	15%
Total vehicles	922	602	65%	320	35%	191	60%	129	40%

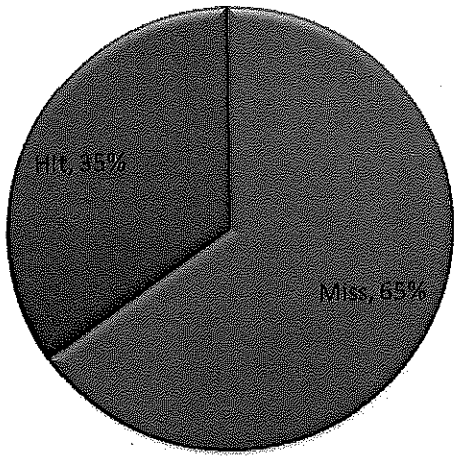

Figure 12. Total vehicles - 6 months after installation

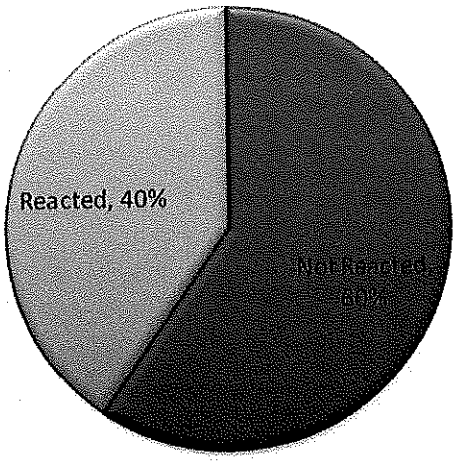

Figure 13. Whether motorists reacted after encroaching onto the cycle lane

Detailed Results – (Audio Tactile Line Marking)

12 Months After Installation

Total vehicles - 12 Months After Installation

	Total	Avoided	% avoided	Encroached	% encroached	Not reacted	% not reacted	Reacted	% reacted
Small vehicles	860	661	77%	199	33%	92	46%	107	54%
Heavy vehicles	43	16	37%	27	63%	23	85%	4	15%
Total vehicles	903	677	75%	226	25%	115	51%	111	49%

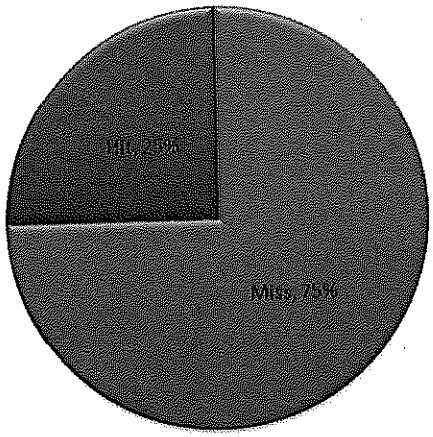

Figure 5. Total vehicles - 12 months after installation

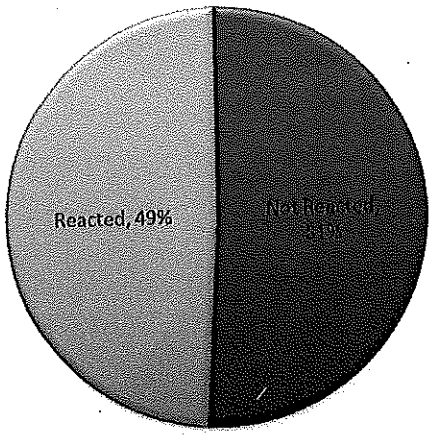

Figure 6. Whether motorists reacted after encroaching onto the cycle lane

2 Test Sites – London Circuit and Vernon Circle

Two sites were chosen to allow the trial to compare the differences between standard and narrow vehicular lane widths. Vernon Circle was chosen where typical lanes widths of 3.5m are provided for vehicles and London Circuit where narrow lanes of 3.0m are provided for vehicles. As was expected, a larger proportion of vehicles on London Circuit were observed encroached onto the adjacent cycle lane.

Vernon Circle Observations

Vernon Circle Southbound - upon installation

	Total	Avoided	% avoided	Encroached	% encroached	Not reacted	% not reacted	Reacted	% reacted
Small vehicles	220	139	63%	81	37%	40	49%	41	51%
Heavy vehicles	3	1	33%	2	67%	2	100%	0	0%
Total vehicles	223	140	63%	83	37%	42	51%	41	49%

Vernon Circle Southbound - 6 months after installation

	Total	Avoided	% avoided	Encroached	% encroached	Not reacted	% not reacted	Reacted	% reacted
Small vehicles	251	180	72%	71	28%	38	54%	33	46%
Heavy vehicles	3	1	33%	2	67%	2	100%	0	0%
Total vehicles	254	181	71%	73	29%	40	55%	33	45%

Vernon Circle Southbound - 12 months after installation

	Total	Avoided	% avoided	Encroached	% encroached	Not reacted	% not reacted	Reacted	% reacted
Small vehicles	421	316	75%	105	25%	54	51%	51	49%
Heavy vehicles	11	4	36%	7	64%	7	100%	0	0%
Total vehicles	432	320	74%	112	26%	61	54%	51	46%

London Circuit Observations

London Circuit Eastbound - upon installation

	Total	Avoided	% avoided	Encroached	% encroached	Not reacted	% not reacted	Reacted	% reacted
Small vehicles	600	368	61%	232	39%	146	63%	86	37%
Heavy vehicles	58	21	36%	37	64%	31	84%	6	16%
Total vehicles	658	389	59%	269	41%	177	66%	92	34%

London Circuit Eastbound - 6 months after installation

	Total	Avoided	% avoided	Encroached	% encroached	Not reacted	% not reacted	Reacted	% reacted
Small vehicles	618	408	66%	210	34%	120	57%	90	43%
Heavy vehicles	50	13	26%	37	74%	31	84%	6	16%
Total vehicles	668	421	63%	247	37%	151	61%	96	39%

London Circuit Eastbound - 12 months after installation

	Total	Avoided	% avoided	Encroached	% encroached	Not reacted	% not reacted	Reacted	% reacted
Small vehicles	439	345	79%	94	21%	38	40%	56	60%
Heavy vehicles	32	12	37%	20	63%	16	80%	4	20%
Total vehicles	471	357	76%	114	37%	54	47%	60	53%

Recommendations

It could be said that the public perception of unsafe cycling infrastructure is one of many reasons for the low numbers of female and non-confident cyclists who cycle in on road bike lanes. From the observations of the sites included in this trial, it could be said that installing cycling separation devices at known potential conflict points would create a safer environment for cyclists to ride on, based upon the observations of driver behaviour.

Cycling in Canberra continues to grow as an attractive and healthy means of commuting and recreation. It is therefore important to continue to provide safe cycling routes and environments for cyclists to ride on. Placing cycling separation devices adjacent to on road bike lanes is likely to increase the perceived safety factors for cyclists and in turn could encourage more non-confident riders to take advantage of the on road cycle network.

Roads ACT, recommends the use of Audio Tactile Line Marking (ATLM) at;

- higher speed locations (80km/h or greater)
- areas of higher volumes of cyclist and vehicular traffic
- known conflict points

Audio Tactile Line Marking separation devices do not require additional road space, as it is typically applied over the existing edge line line marking. If ATLM is to be screed applied, particular attention must be given to the installation (i.e. road surface conditions/temperature, application of line marking, etc) of the product. Not all screed applied sections experienced deterioration to the same extent as shown in Figure 8. However the durability of these varied, depending on the quality of the installation process.

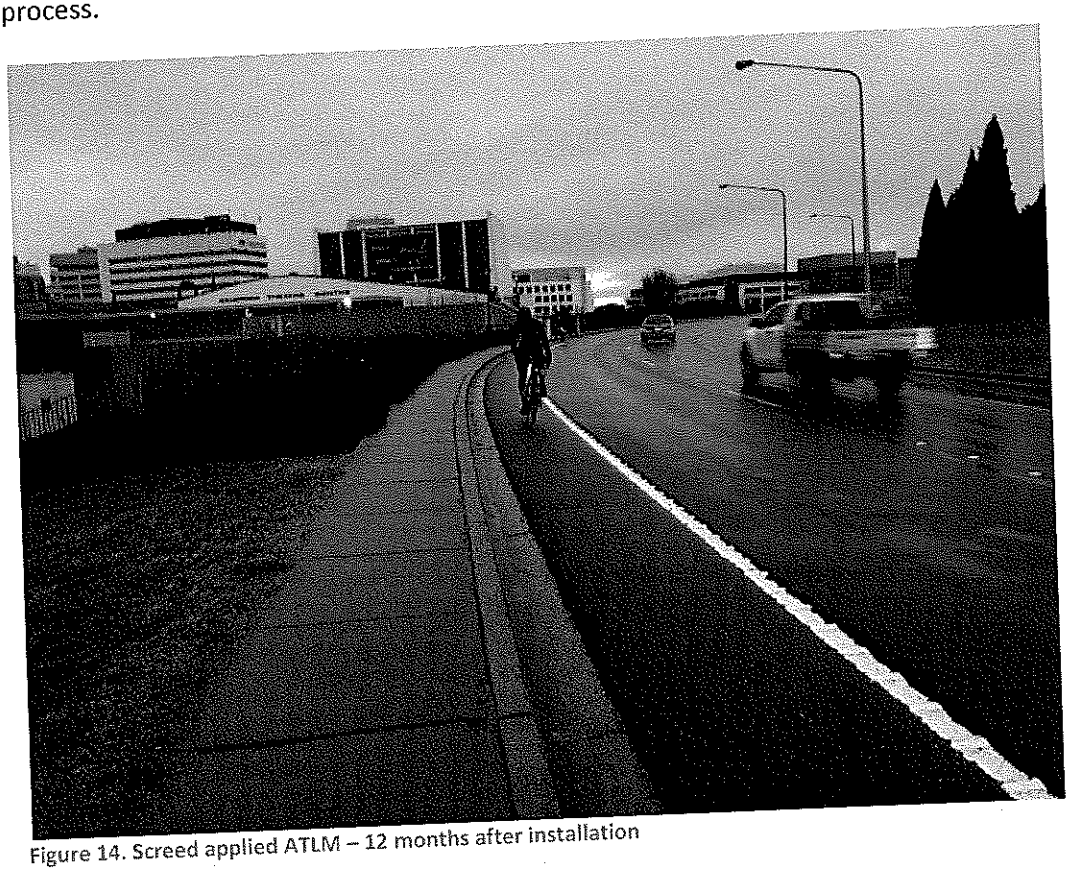

Figure 14. Screed applied ATLM – 12 months after installation

Given the larger profile, tram separators and riley kerb devices are better suited to areas where a high volume of general and heavy vehicles is experienced, as this provides a more distinct warning to the driver. A less physical device, such as ATLM may not provide an adequate warning to change driver behaviour in these locations.

While the quantitative data suggests that motorists are less likely to enter the on-road cycle lanes; the perceptions and comments from cyclists/motorists regarding these separation devices are important to gauge and assess. Therefore, comments were sought from three road user groups. Representations were provided by ACTION Buses representatives who were seen to reflect the heavy vehicle sector, Pedal Power ACT to comment from the cyclists point of view and the NRMA to represent the general vehicle motorist. This has been summarised in the table below. A wide distribution of input and opinions were received, ranging from the effectiveness of different devices, a rating of the safety improvements achieved, and pros and cons of each device.

Table of Comments from Stakeholders

Stakeholder	Preferred device	Comments
ACTION Buses	*Audio Tactile Line*	• Audio tactile line effective in alerting motorists who cross line by vibrating through steering and suspension • Other options may potentially damage vehicles or cause loss of control by motorists and cyclists alike, in wet conditions • Audio tactile line eliminates vehicle damage and minimises wet condition dangers • Audio tactile line is the safest option • Tram separator next best available option • Riley kerbs present an unacceptable safety hazard to cyclists if they happened to hit the device
NRMA	*Audio Tactile Line*	• Depending on speed limit, road users may be more vulnerable to damage or injury with introduced devices • Lane width may be causing the long vehicles to require use of the bike lane when turning, and may explain 'Hits' for heavy vehicles • Black tire marks on devices may reduce reflectivity and obscure visual deterrent (particularly relevant issue at intersections) • Green bike lane would increase visual separation of lanes, or green longitudinal line combined with audio tactile line • http://www.mynrma.com.au/media/NRMA_Decongestion_Strategy.pdf • Zicla Armadillo as option to replace potential granite kerbs • Assumption that bollards suggested are flexible bollards • Another potential flexible bollard option – http://www.rosehillhighways.com/products/cycle-lane-defenders/ • Lane width may not allow for larger separator devices • Flexible barriers are meant to provide a more visible barrier and produce a low risk to motorists • http://www.nal.ltd.uk/news-events-x-last-bollards/
Pedal Power ACT	*No Preference*	• At best all the devices are limited to a warning function reinforcing a psychological incentive for people in vehicles to stay out of the cycle lane. • Critically, the AT line marking appears ineffective in relation to heavy vehicles. Three-quarters of them encroached on the cycle lane, and few reacted to the encroachment.

		• While heavy vehicle numbers are relatively low, the high proportion of encroachments is worrying. • All the devices create a new hazard for people on bikes. The AT lines can be crossed (with some control and discomfort issues for those on high-pressure tyres), but the Riley Kerb Separator appears so obtrusive that a rider accidentally hitting one could fall into the traffic lane, with disastrous results. We have already had several reports of injury crashes caused by riders hitting trial separation devices. • The key problem is that many of our marked on-road lanes are too narrow for these kinds of devices to generate a greater sense of cycling security around vehicles travelling at 60-100 km/h. • TAMS should also evaluate the use in appropriate locations of vertical plastic separators of the type used in San Francisco. • In conclusion, we believe that in practice these separation devices are inappropriate or ineffective for use on standard ACT on-road lanes, and will not introduce new riders to use these lanes, and actually reduce cycling safety. The devices are no substitute for safe, attractive, completely separate cycle ways.

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Appendix

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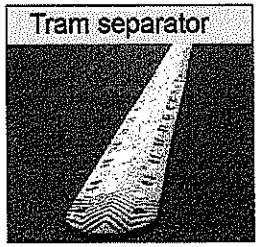
LEGEND

- EXISTING LINEMARKING, SIGNS KERB AND CONCRETE.
- APPLY TACTILE LINEMARKING
- APPLY NEW LINEMARKING
- EXISTING KERB/LINEMARKING
- R5-35 ERECT NEW SIGN

INSTALL 40.1m TCA TRAM SEPERATOR
200mm INSIDE B1 LINEMARKING



ATHLLON DR

40.1 LANE SEPERATOR

ERECT R7-1-4B

LANE

E1 B1 5.0

ERECT R8-1B

ONLY

ATHLLON DR

40.1 LANE SEPERATOR

ERECT R2-3B

LEFT TURN ONLY

SCOLLAY ST

B1

B1 C1

B1 20m

L2 L3 L4

E1 B6

AND REES CR

6980

PROJECT OFFICER	LEIGH COSTA
PROJECT OFFICER	GEETHAKA FERNANDO
DRAFTED	MARK NORTON
DATE PLOTTED	
SCALE	NTS
DRAWING NUMBER	ATTACHMENT A

ACT GOVERNMENT

Authorised pursuant to Part 5 of Road Transport (Safety and Traffic Management) ACT 1999

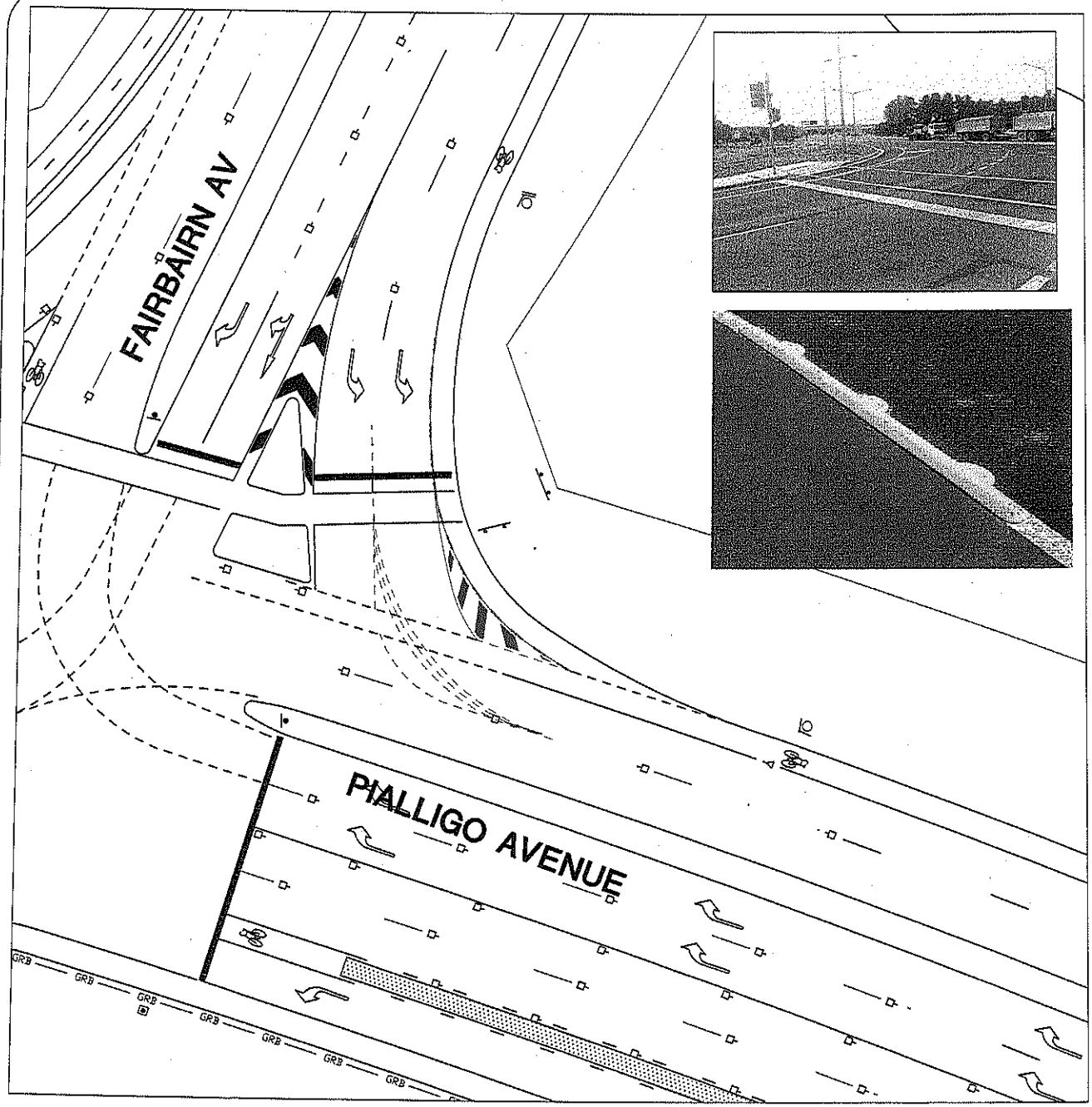
Authorising Signature

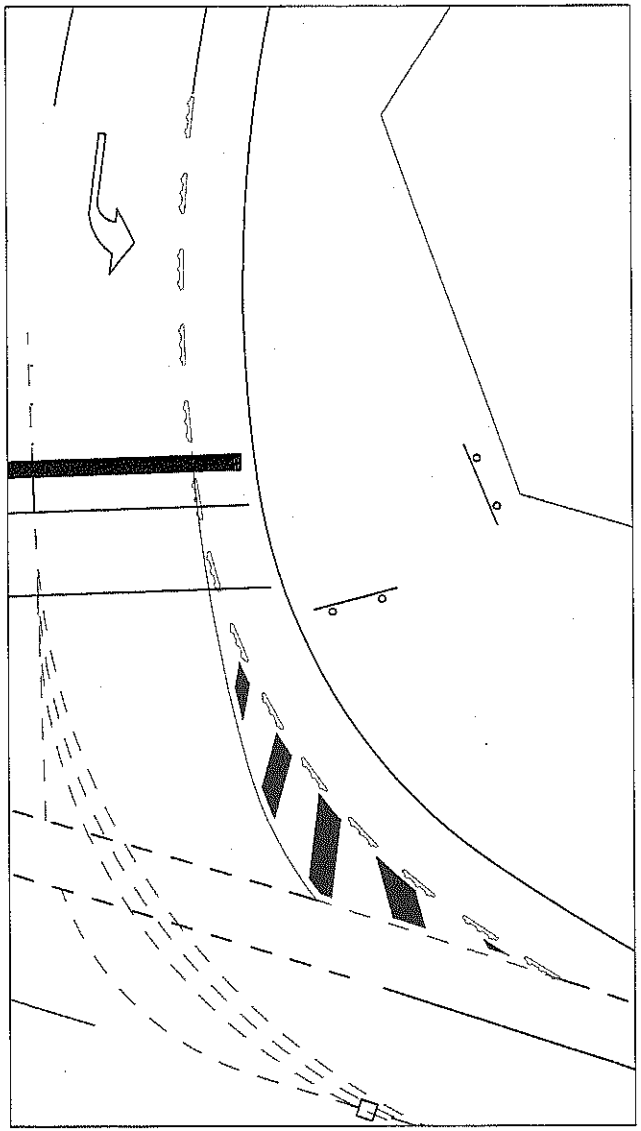
AUTHORISING SIGNATURE

ATTACHMENT A

TRAM SEPERATOR KERB

ATHLON DRIVE





PROJECT OFFICER	LEIGH COSTA
PROJECT OFFICER	GEETHIKA FERNANDO
PHONE NO.	LOCATION
DRAFTED	MARK NORTON
PLOTTED DATE	
DATE PLOTTED	
SCALE	NTS
DOCUMENT NUMBER	ATTACHMENT B
SHEET No	Revision

ACT GOVERNMENT

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Authorising Signature

AUTHORISING SIGNATURE

ATTACHMENT B

RILEY KERB TREATMENT

FAIRBAIRN AVE - PIALLIGO AVE

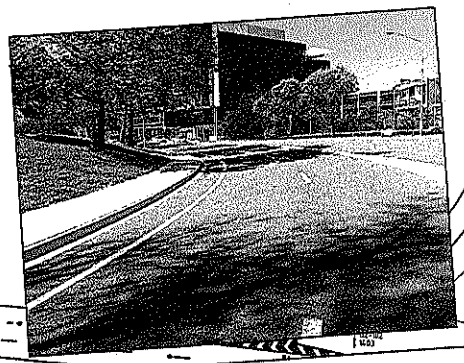
LONDON CCT

COMMONWEALTH AV

COMMONWEALTH AV

COMMONWEALTH PL

AUDIO TACTILE
LINEMARKING TREATMENT
TRIAL LOCATIONS



Army
Training
Centre

PROJECT OFFICER
LEIGH COSTA

PROJECT OFFICER
GEETHAKA
FERNANDO

PHONE NO. SIGNATURE

PROJECT MANAGER
MARK HORTON

ACTIVE STATE

BASE MATTERS

SCALE
NTS

DOCUMENT NUMBER
ATTACHMENT C

SHEET No. REVISION

ACT GOVERNMENT

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Road Transport (Safety and
Traffic Management) Act 1999

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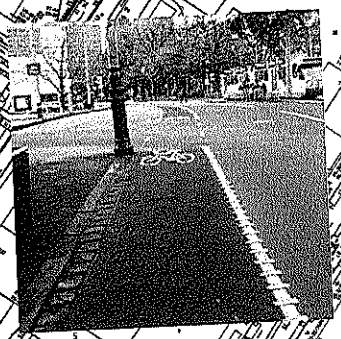
AUTHORISING SIGNATURE

ATTACHMENT C
VIBRALINE TREATMENT
LONDON CIRCUIT



AUDIO TACTILE
LINEMARKING TREATMENT
TRIAL LOCATIONS

VERNON CIRCLE

NORTHBOURNE AV

LONDON CCT

KNOWLES PL

CONSTITUTION AV

COMMONWEALTH AV

PROJECT OFFICER	LEIGH COSTA
PROJECT OFFICER	GEETHAKA FERNANDO
PHONE No.	SIGNATURE
DRAWN	MARK NORTON
AS-CON DATE	
DATE PLOTTED	
SCALE	NTS
DATAPOINT NUMBER	ATTACHMENT D
SHEET No.	REVISION

ACT GOVERNMENT

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Authorising Signature

AUTHORISING SIGNATURE

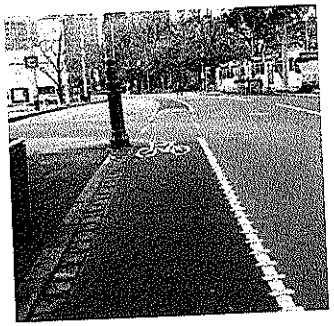
ATTACHMENT D

VIBRALINE TREATMENT
VERNON CIRCLE

LEGEND

- EXISTING LINEMARKING, SIGNS KERB AND CONCRETE.
- APPLY TACTILE LINEMARKING
- APPLY NEW LINEMARKING
- EXISTING KERB/LINEMARKING
- R5-35 — EXISTING SIGN W/CODE

PROPOSED SITE AT
NORTHBOURNE AVE-BARTON HWY



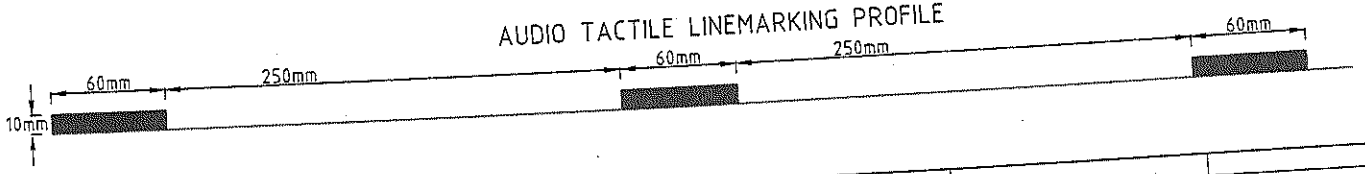
AUDIO TACTILE LINEMARKING
AS APPLIED IN MELBOURNE

42m AUDIO TACTILE
LINEMARKING TREATMENT

BARTON HIGHWAY

NORTHBOURNE AVENUE

AUDIO TACTILE LINEMARKING PROFILE



PROJECT OFFICER	LEIGH COSTA
PROJECT MANAGER	GEETHAKA FERNANDO
PHONE NO / SIGNATURE	
DRAFTED	MARK NORTON
ACTION DATE	
DATE PLOTTED	
SCALE	NTS
DRAWING NUMBER	ATTACHMENT E
SHEET NO / REVISION	

ACT GOVERNMENT

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Authorising Signature

AUTHORISING SIGNATURE

ATTACHMENT E
VIBRALINE TREATMENT
NORTHBOURNE AVE - FEDERAL HWY