

TECHNICAL NOTE

EVALUATION OF THE C-ROUNDAABOUT

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ABSTRACT:

TES is undertaking a NZTA research project: "Evaluation of the C-Roundabout – a new design tool for economically improving safety and capacity at urban road intersections". The C-Roundabout is a new type of two-lane roundabout designed to reduce vehicle speeds specifically for the benefit of cyclists, but also to improve pedestrian and driver safety. It also allows for economic application at existing single-lane roundabouts for improved capacity at minimal cost.

Multi-lane roundabouts are viewed by cyclists as one of the most hazardous intersections and have high casualty rates for cyclists relative to motorists. Thus in order to encourage cycling on NZ roads, cyclists need to be better catered for at roundabouts. The C-Roundabout was developed as part of a previous LTNZ Project "Improved Multi-lane Roundabout Design for Cyclists" in 2005.

A C-Roundabout was constructed in April 2009 in Waitakere, Auckland and is currently being road-tested and evaluated. Preliminary results are positive, with some substantial reductions in operating speeds being achieved. Feedback from cyclists, pedestrians and drivers is also being obtained.

The paper will present the findings from the evaluation, and allow for discussions of the application of the C-Roundabout and its concept. It addresses Road Safety, Travel Behaviour and Mode Choice.

INTRODUCTION

This project is a follow up to the 2005 Land Transport New Zealand project “Improved Multi-lane Roundabout Design for Cyclists”, and potentially gives Road Controlling Authorities a tool to improve safety for cyclists and pedestrians, and also to increase roundabout capacity at minimal cost. This previous research showed that adult commuter cyclists (whom are generally more able and confident riders), would prefer to stay on the road rather than use some kind of off-road facility – provided that vehicle speeds were around 30 km/h or less. The C-Roundabout uses European-style confined geometry to achieve this low speed environment, and consequently requires larger vehicles such as trucks or buses to travel through single file. Cyclists are not provided with a separate facility, instead they are expected to travel through as if they were a car user in the specifically designed narrow traffic lanes of around 2.6 metres wide. Speed differential between cyclists and car traffic is expected to be a maximum of around 10-15 km/h, or less in busy peak hour periods.

A C-Roundabout was constructed in November 2009 at the Palomino Drive/Sturges Road intersection in Waitakere, Auckland and is currently being road-tested and evaluated.

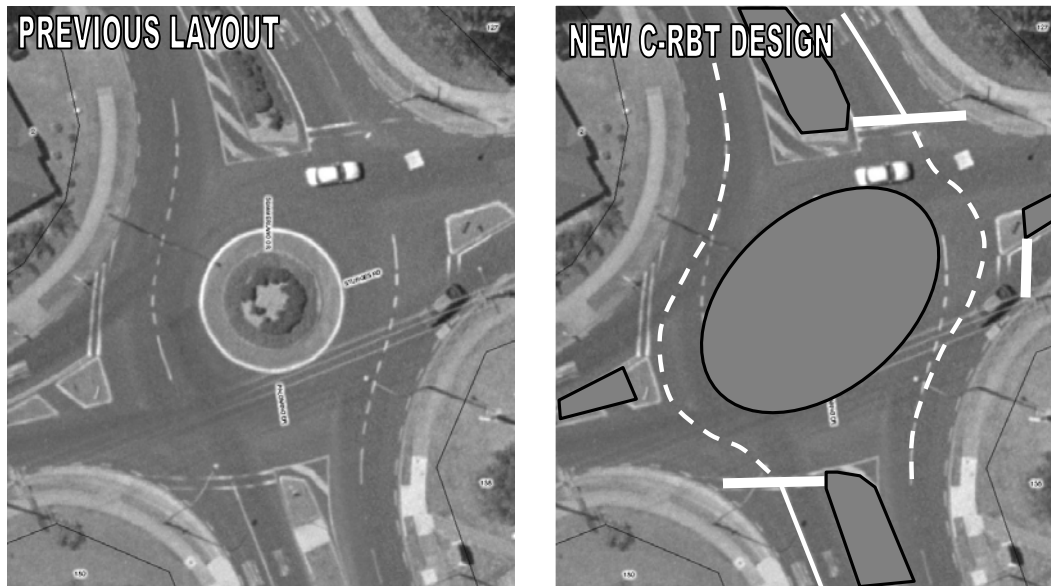


Figure 1: Simplified diagram showing redesign of the Sturges Road / Palomino Drive roundabout in Waitakere City, Auckland.

BENEFITS OF THE C-ROUNDAABOUT

The C-Roundabout concept is potentially applicable to any new multi-lane roundabout design, and is expected to substantially improve the road environment for cyclists. The following benefits can also be attributed to other road users:

- Pedestrians – the lower speed environment means that any pedestrian facilities in the vicinity of the roundabout should be safer. This includes zebra crossings, traffic signals and informal crossing points at roundabout throat islands.
- Vehicle drivers – even though well-designed roundabouts generally have a good safety record in terms of injury-related crashes, an even lower speed environment means that any crashes that do occur will be less severe. .

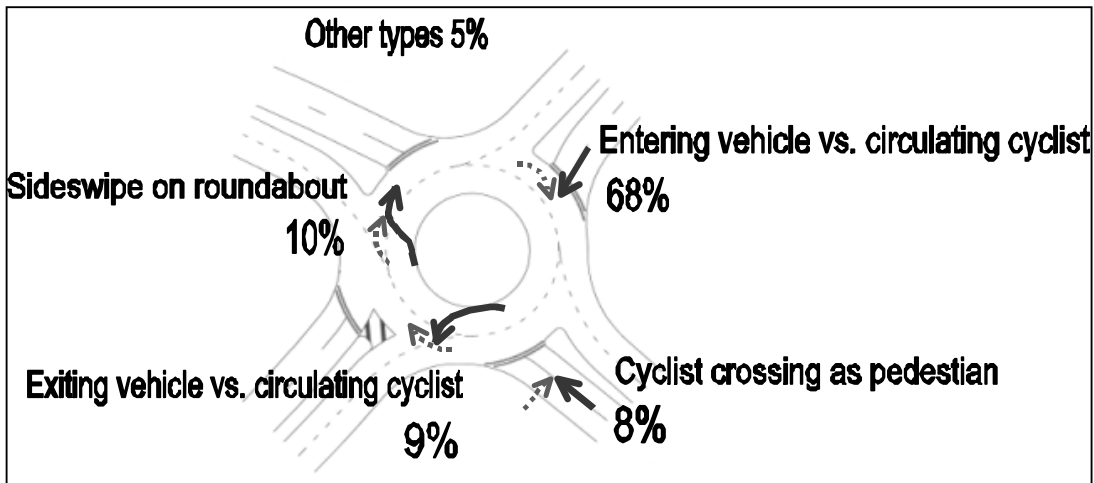


Figure 2: Summary Diagram of crash data for cyclists at multi-lane roundabouts in Auckland (non-injury and injury) 1995 to 2004 (59 reported crashes)¹. Note that the 'entering vehicle versus circulating cyclist' is the most prevalent crash type, and is considered to be best addressed by an overall decrease in the traffic speed environment. The C-Roundabout is an attempt to achieve this.

However, it is recognised that these benefits alone may not justify relatively expensive reconstruction of an existing multi-lane roundabout. For economic reasons many Road Controlling Authorities may find the C-Roundabout more realistically viable for:

- Smaller intersections or single-lane roundabouts being upgraded for capacity reasons. The C-Roundabout concept can achieve compact designs compared to a typical multi-lane arrangement, and for this reason may potentially be the best economic solution available for a capacity improvement.
- Treating existing multi-lane roundabouts on particularly important cyclist routes. Unless there are a substantial proportion of trucks (which is usually not the case in peak hour periods), the capacity of the C-Roundabout compared to a standard multi-lane configuration is not expected to be significantly affected.
- New intersections in green field developments.

STURGES ROAD / PALOMINO DRIVE ROUNDABOUT EVALUATION RESULTS

Since the roundabout was changed to a C-Roundabout during 2009, an analysis of video-taped operation during peak hours indicates that the C-Roundabout is operating very well. Signs have been erected in order to educate large vehicle drivers that they should use both approach lanes, and in combination with the narrow lanes these appear to be working well.

Preliminary comparison of unopposed through-vehicle speeds before and after the roundabout was constructed, show that 85% operating speeds have been reduced to between 28 – 33 kph. This appears to demonstrate that the key objective of the C-Roundabout project has been achieved, which is to provide a low speed environment for cyclists to be able to share the road safely with car drivers.

The next stage in the evaluation is to get feedback from cyclists, pedestrians and drivers. A cyclist survey has been undertaken which has received a positive response from cyclists. Feedback from pedestrians and drivers is currently being undertaken.

¹ Land Transport New Zealand Authority Report 287 (2005) Multi-lane Roundabout Designs for Cyclists



Figure 3: Photo showing information sign to motorists indicating that large vehicles should straddle both lanes.



Figure 4: Photo showing a bus straddling both lanes whilst waiting at the roundabout limit line to turn right.



Figure 5: Photos showing a cyclist travelling through the C-Roundabout using the middle of the traffic lane as desired.