Technical Note:

SEPARATED BICYCLE FACILITIES IN CHRISTCHURCH

Authors:

Andrew Macbeth, BE, MEng, CPEng, FIPENZ (Director, ViaStrada Ltd)

andrew@viastrada.co.nz

John Lieswyn, BSc (Transport Planner, ViaStrada Ltd)

john@viastrada.co.nz

Ruth Foxon, BSc, MSc, AIEMA (Policy Planner – Transport, Christchurch City Council)

ruth.foxon@ccc.govt.nz

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ABSTRACT

Over recent decades in Australia and New Zealand, provision for cycling has typically consisted of on-street cycle lanes. Road networks have become increasingly congested and unattractive to existing and potential cycle users. Surveys of Christchurch residents have shown that separated facilities are the most likely facility to encourage new users to cycle in the city.

Separated facilities as found in northern Europe are not directly transferable to New Zealand due to different traffic regulations and road carriageway design. Based on a scoping study in Christchurch, this technical note analyses which design concepts are likely to be appropriate for typical road environments in New Zealand. The study aimed to ensure that facilities would be attractive to both new and existing users. Adoption of such innovative designs will not only contribute to increasing the numbers of people cycling but also provide a safer and more cost-effective transport system.

INTRODUCTION

Cycle facilities installed in New Zealand over recent years have consisted of on-street cycle lanes, various intersection treatments (such as advanced stop boxes, advanced stop lines and hook turns) and off-road shared paths. Off-road paths typically are alongside geographic features such as rivers, lakes, shorelines or parks, or transport infrastructure such as roads or railways. Where off-street facilities have been provided, these are often of insufficient width and lack priority at intersections.

Many local authorities are now considering new ways of encouraging people to cycle. In Christchurch, the future cycle system aims to offer an everyday transport choice that is safe, attractive, connected and accessible for most people. This not only combats traffic congestion and improves road safety, but improves the health and well-being of residents.

Dill and Gliebe (2008) note that "women and people who bicycle less frequently appear to be more concerned about bicycling on facilities with a lot of motor vehicle traffic, including bicycle lanes on major streets". While it may seem intuitive, it has been demonstrated in numerous stated and revealed preference surveys that the general public clearly prefers greater separation from motor vehicles (Bauman et al., 2008, Jensen, 2008, Pucher, Garrard and Greaves, 2010, Rasmussen and Rosenkilde, 2007, Koorey, Kingham and Taylor, 2009). In a Christchurch survey, Taylor (2008) found that the level of infrastructure that would most likely attract new cyclists is a comprehensive, linked network of cycling facilities, preferably removed from the road and parking through physical separation.

A separated bicycle facility (SBF) is defined as a facility in a road corridor exclusively for cycling with physical separation from motor vehicles. In two surveys of Christchurch residents, such facilities were found to be the on-road facility type most likely to encourage new users to cycle. While the target market is new users, a well designed SBF will also be attractive to most existing cyclists.

This technical note analyses the design characteristics of good quality SBFs for different road environments, based on a scoping study for a separated bicycle facility for the Christchurch City Council.

INTERNATIONAL PRACTICE

The Netherlands, Denmark and Germany have achieved a significant increase in cycling patronage in part by providing good cycling environments and a supportive legal framework. While European experience is relevant, the Christchurch scoping study focused on case studies of recent SBFs in countries with a similar built environment to New Zealand. Analysis of case studies from Melbourne, Sydney, Adelaide, Christchurch and the USA suggests that key success factors include planning a direct route which connects key destinations and having a robust communication plan during planning and implementation.

Safety concerns about SBFs are outweighed by the safety in numbers effect (Krizek, Forsyth and Baum, 2009) and can be mitigated by appropriate design treatments. Advice on treatments appropriate to New Zealand is not well developed, so the scoping study sought to collate and reconcile the (sometimes conflicting) advice of research papers and design guides from Australia, the Netherlands, Denmark, the United States, and the UK. Together with recent practical experience, this review informed the design concepts by addressing one or two-way operation; widths, separation options, driveway treatments, intersection designs, and signage.

DESIGN RECOMMENDATIONS

The scoping study analysed a variety of routes and design cross-sections for a corridor between the University of Canterbury and the central city, a distance of about 4.5 km (Figure 1). The study also considered car parking, pedestrians, landscaping and network signage. The following selected road environments and their corresponding recommended design concepts illustrate the range of solutions expected to be appropriate in New Zealand.

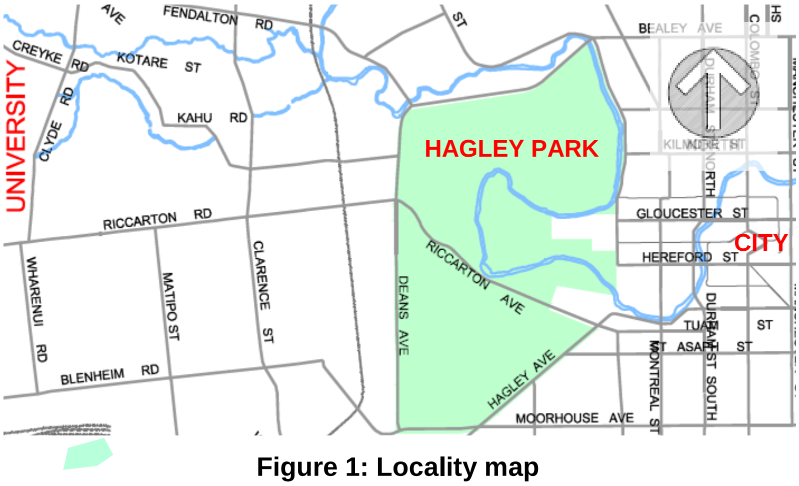

Figure 1: Locality map

Suburban collector road with dual facilities

<u>*Road Environment*</u>**:** Collector road with average of 12,000 vehicles per day, existing on-street cycle lanes, adjacent to university and residential areas.

<u>*Design Concept*</u>: a two-way shared path on University land potentially linking to an upgraded campus path network. This solution preserves the existing on-street cycling lanes for through cyclists, while providing separation from motor vehicles for cyclists on a new off-road facility alongside the University. Traffic signals are recommended at an intersection to provide a safe and convenient crossing facility. Such treatments are often needed where a two-way off-road path or SBF terminates, so that cyclists can safely resume cycling on the correct side of the road.

Constrained local road with shared path

<u>*Road Environment*</u>*:* Local residential street, low traffic volume, with high parking demand due to its proximity to the university and other attractions. The area has relatively light parking restrictions. Some motorists use the route as a rat-run to avoid congestion on nearby collector roads. These characteristics can result in a stressful cycling environment at peak traffic times. The footpaths, berms, trees, and kerb and channel have all been recently renewed. There is already a 500 m-long two-way SBF on the street.

<u>*Design Concept*</u>*:* Parking is currently permitted only on the north side, therefore the installation of a separated cycle path will be easier to achieve on the south side. The design concept would form part of an extension to the existing two-way cycle path which adds value to the previous cycle path investment. This proposal is illustrated in Figure 2.

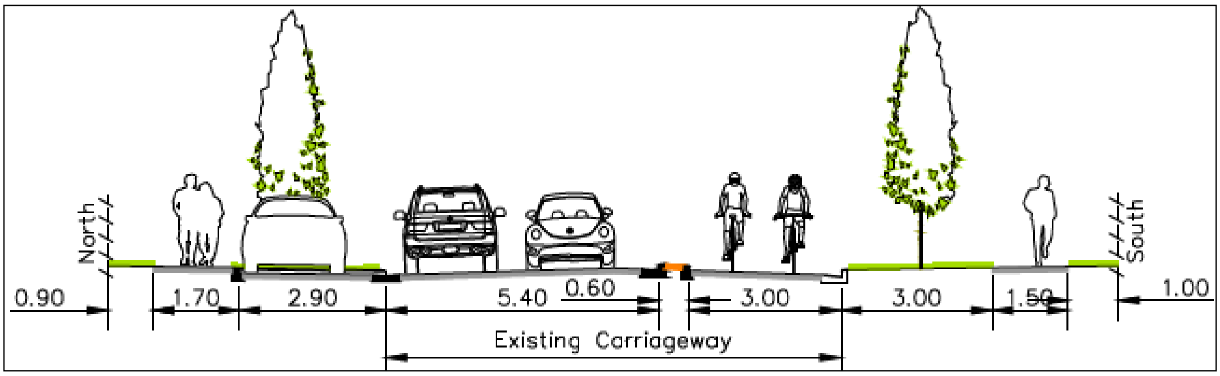

Figure 2: Local Street proposed cross section

Another option would be to create a low traffic speed and volume environment through traffic calming including diagonal diverters (physical closure of an intersection across a diagonal to prevent straight-through access by motor vehicles, while still allowing pedestrians and cyclists through). Such treatments have facilitated the creation of “Bicycle Boulevards” (priority routes for cyclists) in North America (Walker et al., 2009). The intersections carry very low traffic volumes and are at the end of short blocks, hence it is expected that most people will be comfortable cycling without dedicated facilities.

Park with wide shared path and new signalised crossing

Road Environment: Shared paths through Hagley Park, near large schools. Major roads on the periphery of the park are a significant barrier for path users of all ages (Figure 3).

Figure 3: A major road (foreground) is a barrier to an otherwise direct and pleasant path

Design Concept: Widen and extend existing shared paths. Install demand responsive midblock signals[1] with separate equipment and phasing for pedestrians and cyclists (Figure 4 and Figure 5). Coordinate signal timing with adjacent signals and modify upstream approach layout to eliminate lane changing distractions and improve new midblock signals recognition.

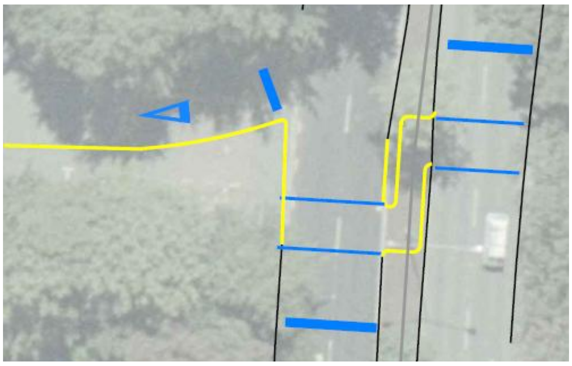

Figure 4: Proposed midblock signals

Figure 5: Nearby existing midblock signals

Central city arterial with one way SBFs

Road Environment: Central city minor arterial with average 8,000 vehicles per day, serving as a key route for pedestrians, cyclists, buses and tram. An existing off road shared path is too narrow at peak travel times. Adjacent to a park, museum, hospital and arts centre.

Design Solution: One-way SBF on each side; retain existing shared path (Figure 6).

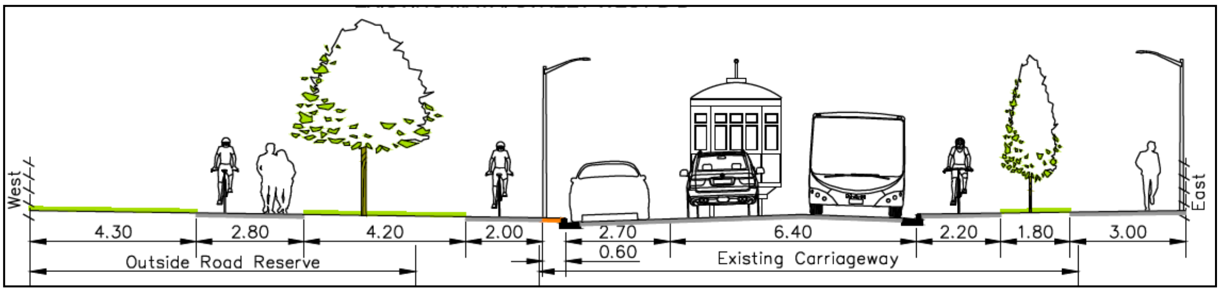

Figure 6: Central city boulevard concept

[1] See also http://viastrada.co.nz/pub/harper-ave-crossing for a related example

This change will decrease through traffic volumes and speeds and improve the amenity of this key tourist avenue. A complete streetscape upgrade is proposed which could be an opportunity to showcase one-way cycle paths and achieve multiple objectives.

Central city local street with one-way SBFs

Road Environment: Central city local road with average 7,300 vehicles per day, no landscaping, a wide carriageway, and unrestricted parking.

Design Solution: One-way SBF and landscaped berms with indented parking are proposed along each side of the street (Figure 7). Closer to the centre of the city, it is proposed to upgrade the whole street to a shared space environment as part of the Project Central City programme.

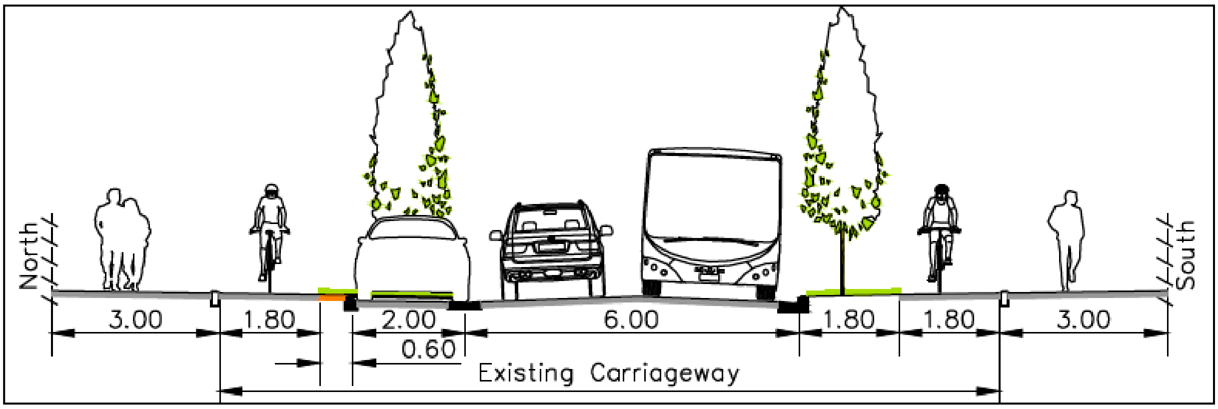

Figure 7: Central city local street concept

APPLICABILITY FOR ELSEWHERE IN NEW ZEALAND

Where traffic speeds are less than 30 km/h and volumes are low, road space can be shared by cyclists and motorists (and pedestrians). Many New Zealand streets have not been designed well for this type of operation and will take many years to modify. In the meantime, selected streets could be provided with well designed cycle lanes or SBFs.

Christchurch has typically wider streets than Wellington and Dunedin (with their hills and constrained transport corridors), but many other New Zealand towns and cities have similar street designs. The scoping study undertaken for the Christchurch City Council has demonstrated the technical feasibility of SBFs on New Zealand streets. Where there is a (political) will; there is a (technical) way.

CONCLUSIONS

Separated bicycle facilities (SBFs) are an important part of creating a transport system which provides choice to everyone. They are increasingly common in Australia and North America, following the European model for cycling facilities. By providing greater separation from motor vehicle traffic, these facilities provide future cycle users with a higher perception of safety than cycling on conventional streets or on cycle lanes. The Christchurch scoping study findings show that different facilities are appropriate in different circumstances.

The scoping study found that it is feasible to create a direct and attractive cycle route using a combination of off-road paths, quiet streets, two-way SBFs on slightly busier roads and one-way SBFs (on each side of a road) for the busiest roads. New traffic signals would be needed to create safe arterial road crossings for cycling and walking.

The findings suggest that SBFs can be designed for many types of road environment in New Zealand. In an increasingly fossil-fuel-constrained and carbon-conscious world, where healthy lifestyles are becoming more important from both societal and individual perspectives, these new facilities should be considered amongst the options for encouraging and providing for cycling in our urban areas.

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