



Buffered cycle lane design

TN004

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1 Introduction

This technical note has been developed to assist in the design of buffered cycle lanes. As detailed throughout the *Cycling Network Guidance* (CNG), the decision to implement buffered cycle lanes depends on many factors (both high-level and site-specific), one of which is carriageway width.

Understanding the street function and context will determine what other cross-section elements are required or desired and the space available for these elements in addition to cycle facilities.

At certain available widths, it may either not be feasible to provide buffered cycle lanes, or there may be so much space that another form of provision becomes possible. As such, the provision of buffered cycle lanes should be assessed alongside other facility options.

An important distinction is that a buffer adjacent to a traffic lane is *in addition to* the width of a cycle lane. A buffer adjacent to parking is placed *within* the width of a cycle lane.

2 Buffered cycle lane design

Buffered cycle lanes comprise a conventional on-road cycle lane with a marked buffer between the cycle lane and moving traffic lane and/or parking lane. The use of the buffer can encourage people riding a bicycle to travel outside the door opening zone but can also increase the perception of safety by having something between the rider and the traffic lane. They also make it easier for drivers to pass cyclists at a safer distance.

Many of the concept design considerations around buffered cycle lanes are developed from existing guidance in the CNG on on-road cycle lanes. However, there is scope for further research into the design of this facility type, and the areas for further work are identified through the text below.

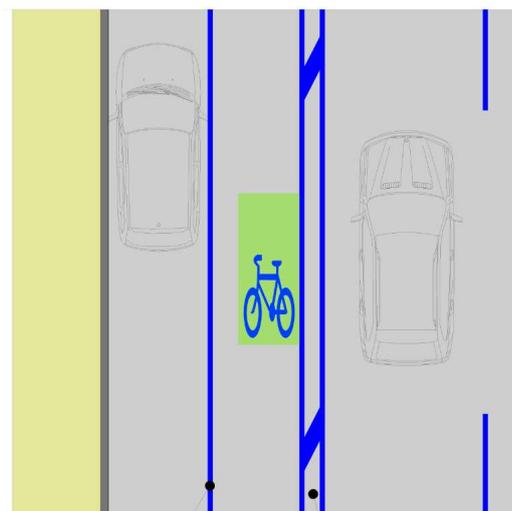
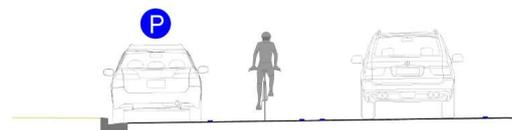
Parking side buffer configuration

- Drivers will use the parking space markings as a guide (i.e. rather than the kerb) – therefore, parking spaces should be kept narrow, so that good parking discipline is encouraged, allowing people on bikes to avoid opening car doors.
 - A well-defined line is required at the side adjacent to the parking, so that drivers do not consider any buffer between parking and cycle lane as an extension of the parking zone.
- The door zone of parked vehicles is an *actual* safety concern for people on bikes.
 - The current default is to not mark a painted buffer between the parking lane and cycle lane. To encourage cyclists to keep away from the door opening zone, it is recommended that the cycle lane symbol and green surfacing are marked closer to the general traffic lane (e.g. Figure 2). Note that the preferred shade of green surfacing is Apple Green G26.
 - The following section of this technical note assumes that the markings will be provided *within* the stated width of the cycle lane and an offset is provided.
 - There is need for more research to identify how much influence such an offset has on the position of the rider in the lane.

- Some RCAs mark buffers between the parking and cycle lane. This will only keep people on bikes safe from the door zone if good parking discipline is achieved.
 - Some studies suggest that marking parking buffers result in poorer parking discipline. There is scope for further research into this, including consideration of different buffer marking styles that could reduce this issue.
- The Figures below show the recommended layout for a buffered cycle lane next to parking.



Figure 1: Cycle lane with symbol offset from parking, buffer to general traffic lane, Nelson. Photo: E Teekman



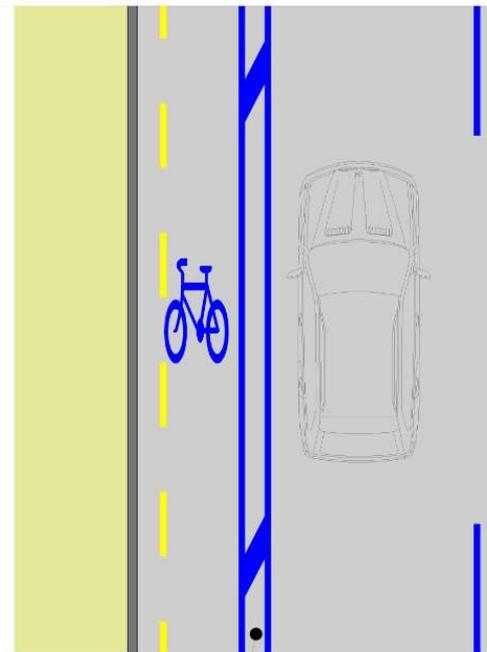
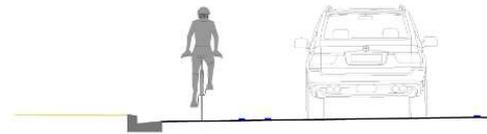
100mm edge line

2 x 100mm edge lines with 300mm (nominal) gap & chevrons @ 25m c/c

Figure 2: Road markings for parking and cycle lane buffer

Traffic adjacent buffer configuration

- People on bikes often have a *perceived* safety issue of conflict with moving traffic.
 - The current default is to mark a buffer between the cycle lane and the general traffic lane (i.e. a traffic-adjacent buffer) to address this perception (e.g. Figure 2).
- Buffer styles that could be marked between the cycle lane and traffic lane should be parallel lines with diagonal stripes aligned according to the direction of motor vehicle drivers.



2 x 100mm edge lines with
300mm (nominal) gap &
chevrons @ 25m c/c

Figure 3: Road markings with buffer between cycle lane and traffic lane

3 Design parameters

The following graphic (Figure 4) outlines various scenarios depending on the priorities for provision and elements that are introduced (established) as available carriageway width increases.

Table 1 outlines the basic parameters used to develop the design and gives instructions and examples for how to use these charts.

It is important to note that the figure does not represent a layout plan for a roadway; they are provided to inform the possible combinations of elements at a given cross-section width.

3.1 Buffered cycle lanes, establishing parking

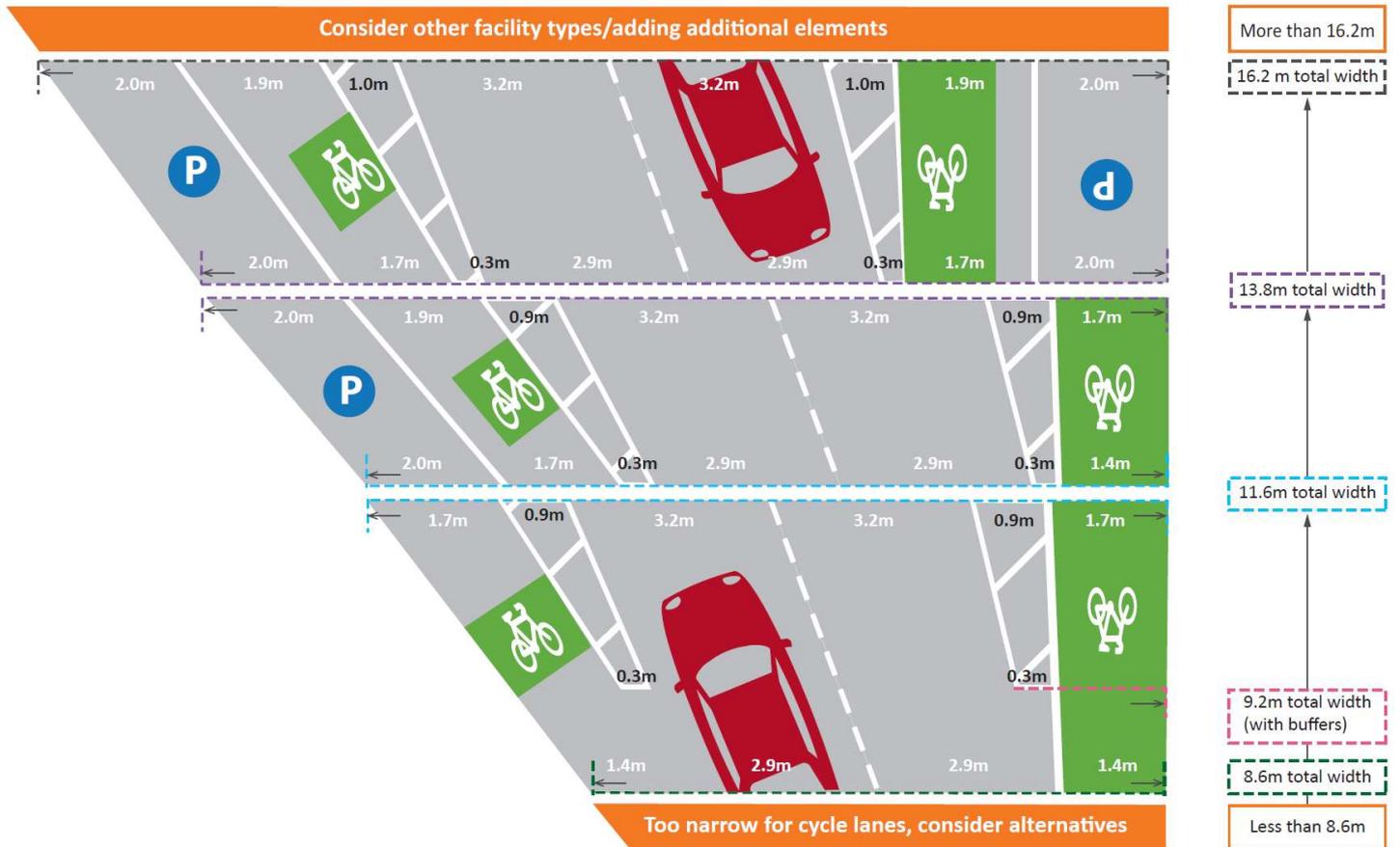


Figure 4: Design: standard cycle lanes – buffered cycle lanes – establishing parking

The design charts are based on the following basic parameters; these should be considered if modifying the configurations obtained from the design charts:

Table 1: basic parameters for cross-section elements for buffered bike lane design

Key	Element	Desirable min	Acceptable min	Practical max
	Parallel parking	2.0	2.0	2.5
	Cycle lane – next to parallel parking	1.8	1.7	2.0
	Cycle lane buffer – traffic side	1.0	0.3	1.0
	General traffic lane	3.2	2.9	4.5
	Cycle lane buffer – traffic side	1.0	0.3	1.0
	Cycle lane – kerbside	1.6	1.4	1.8
	Flush median	2.5	0.5	4.0

Notes:

- The values for the basic parameters are taken from the CNG and its various sources.
- The acceptable minima are used as the starting point for all combinations, with widths working up to the desirable minima, or the point at which the next combination is deemed acceptable.
- The acceptable minima stated should be used as a guide only, and with caution; they may vary depending on the local authority, or site-specific context. A design option that contains all acceptable minimum elements is likely to result in increased safety risks and should be avoided.
- The practical maxima are guidelines only and are rarely achieved in reality (thus not shown on the charts), as the additional width can normally be better allocated elsewhere.

3.2 Instructions for use

The resulting cross-section depends on the elements of the cross-section that are desired and the available width in the existing roadway.

Calculate element widths

The width of each element on the carriageway is calculated from the difference between successive cumulative widths. An example below is for a carriageway width of 13 metres. This shows that when applying the dimensions from Table 1, buffered bicycle lanes could be provided with parking also being provided on one-side of the carriageway.

Example:

Element	Element width	Cumulative width
Cycle lane	1.6 m	1.6 m
Buffer	0.7 m	2.3 m
General traffic lanes	2 x 3.1 m	8.5 m
Buffer	0.7 m	9.2 m
Cycle lane	1.8 m	11.0 m
Parking	2.0 m	13.0 m

Re-distribute width if necessary

In cases where the acceptable minima (see Table 1) have been achieved for multiple elements, there is scope to redistribute width among the elements, according to site-specific objectives and constraints.

For example, in locations with speed limit greater than 50 km/h, or a high proportion of heavy vehicles, it may be preferred to increase the width of general traffic lanes before increasing the width of the cycle facilities. Conversely, in locations with high cycling and e-scooter demand, it may be preferable to increase the width of the cycle facility before increasing other elements above their acceptable minima.

3.3 Tips for finding space

If there is insufficient space for the desired configuration, it will be necessary to either:

- Re-examine the priorities in terms of which elements to provide and choose different elements.
- Consider gaining space from somewhere else (e.g. relocating the kerb lines).

In some cases, the cross-section width will vary along a corridor. It *may* be acceptable to reduce widths of certain elements for short sections of road – the CNG should be consulted if this affects the cycle facilities. Usually, it will be necessary to transition to a different configuration. Where possible, it makes sense to retain a consistent type of cycle provision along a corridor – for example, if buffered cycle lanes are desired, it is preferable to remove parking than to revert to standard cycle lanes for a section with reduced cross-section width.

A range of examples are included below.

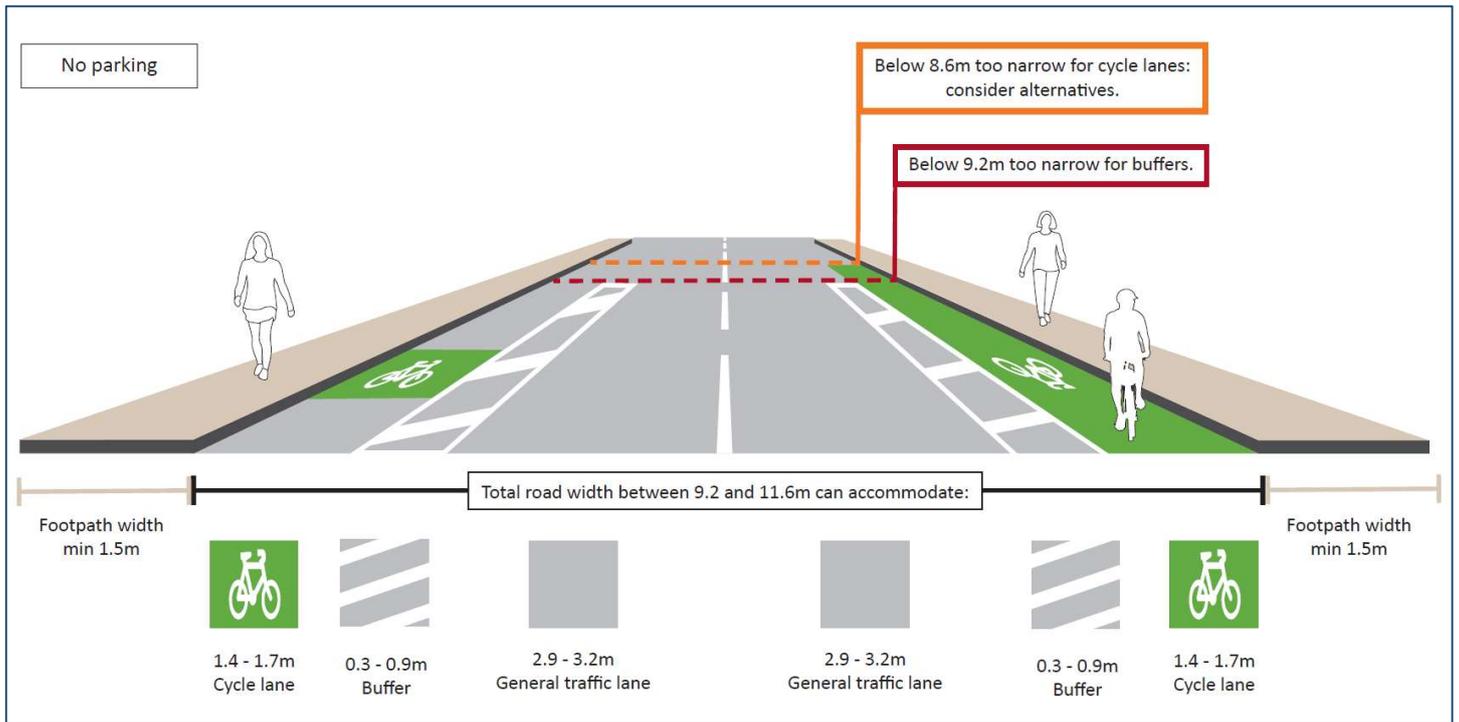


Figure 5: Cross-section widths for narrow carriageways

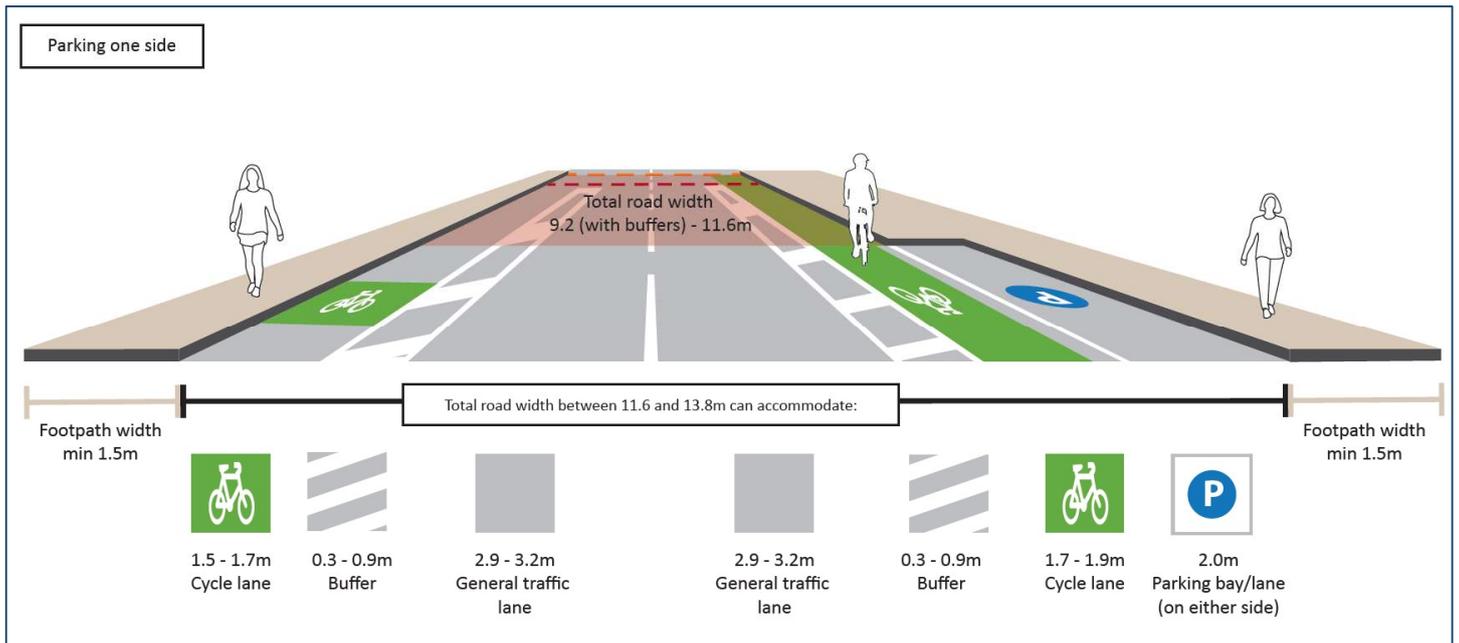


Figure 6: Cross-section widths that could accommodate parking one side

Technical Note: Buffered cycle lane design

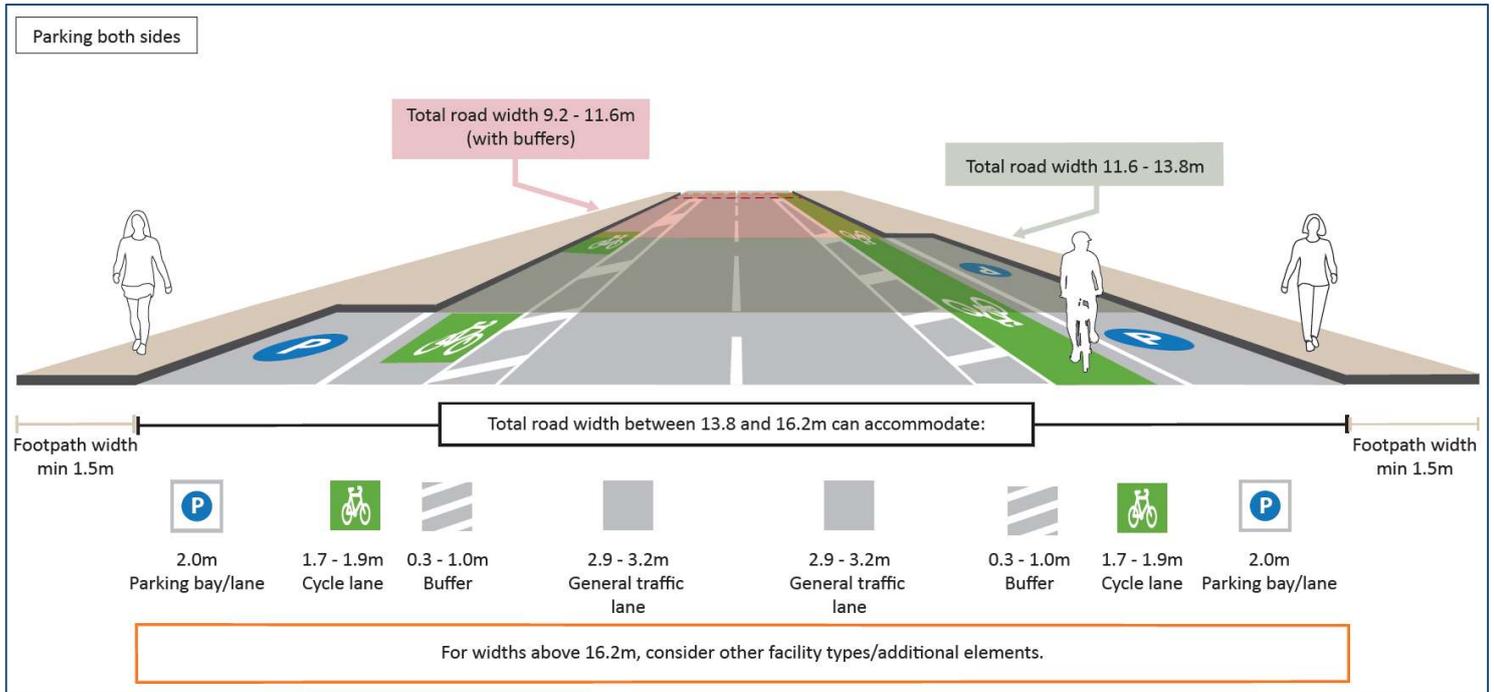


Figure 7: Cross-section widths that could accommodate parking on both sides

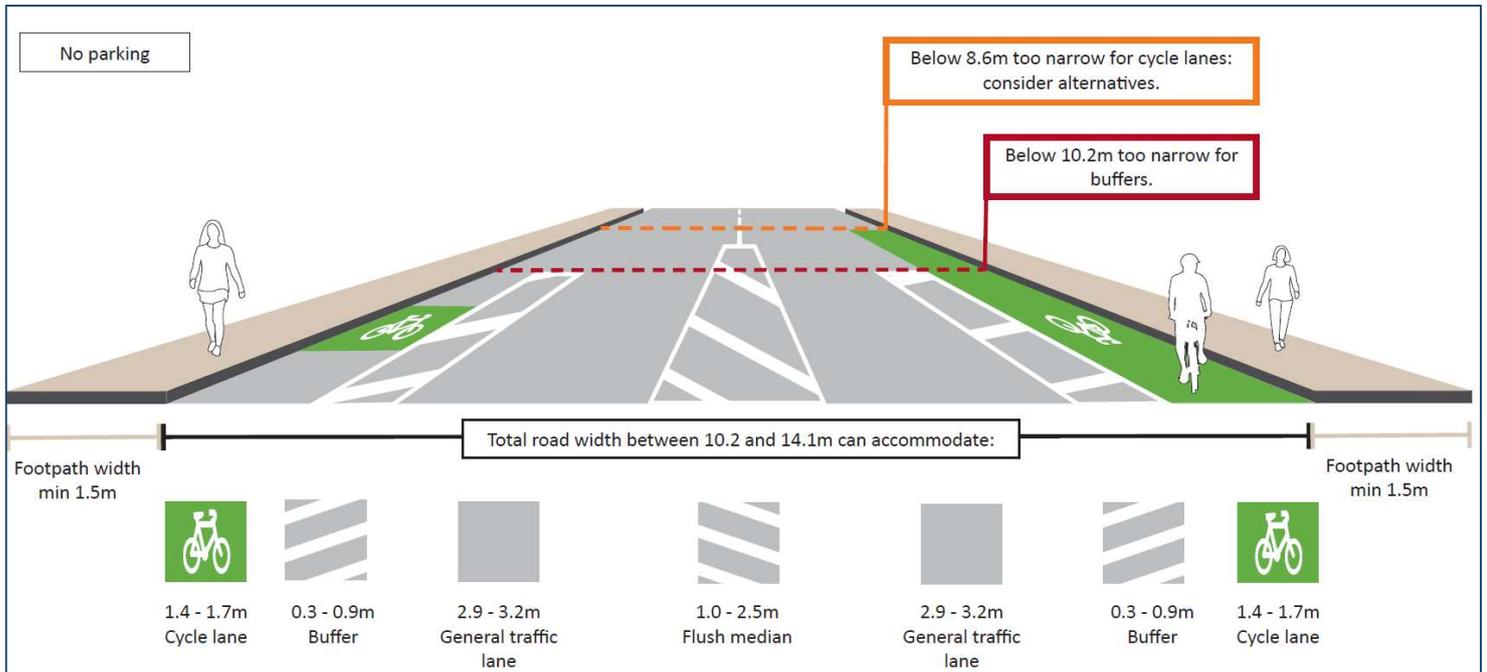


Figure 8: Cross-section widths that could accommodate a flush median

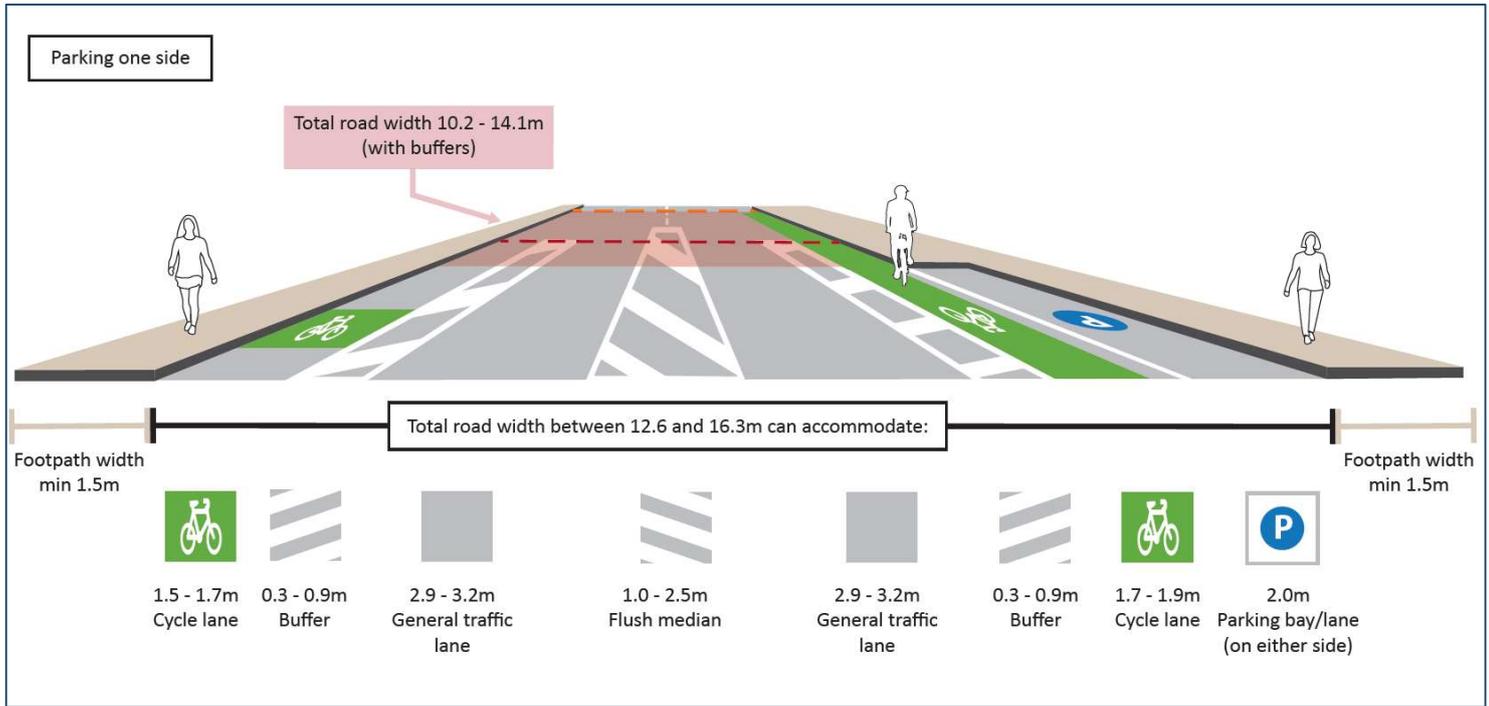


Figure 9: Cross-section widths that could accommodate a flush median and parking on one-side

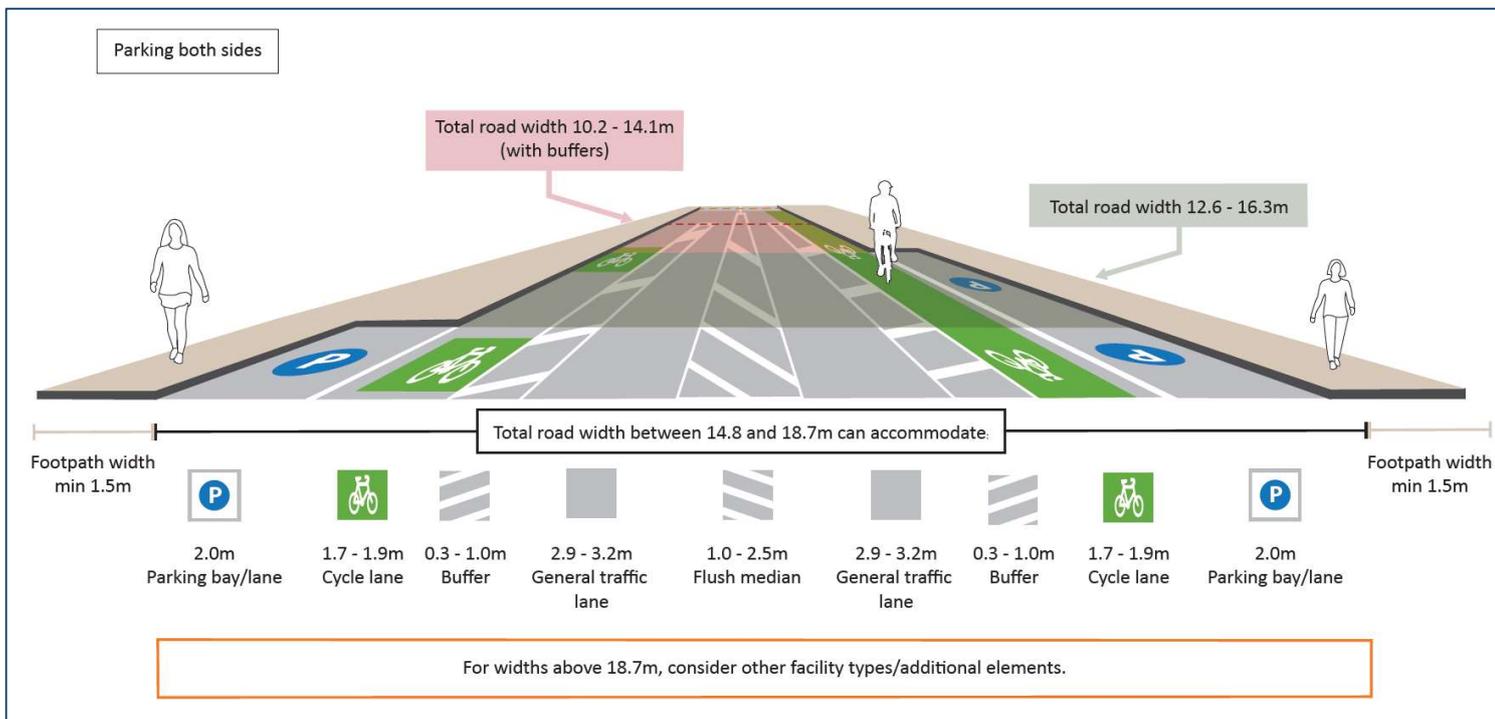


Figure 10: Cross-section widths that could accommodate a flush median and parking on both sides

Where the width is greater than 18.7 metres there could be a greater buffer between the cycle lane and parking, to improve comfort and safety for those getting out of parked cars, or those parking larger vehicles. The designer should consider the local conditions and context, the users of the parking bays, the speed of the road and the users of the cycleway.