Cameron Road Multi-modal Corridor Project, Engagement Record

Table 2 BOPRC Cameron Rd Multimodal 80% Design Review

	Comments	Action/Resolution	
0	**Safety Audit** We expect that a Safety audit will be completed for the design to ensure that the project achieves an outcome consistent with the safe system approach. As such, subsequent comments relate to high level design decisions and do not constitute a full review of all components of the design. **Proposed Action/Resolution** Conduct a safety audit.		
1	**Northbound bus stop between Elizabeth St and Spring St (General Arrangement Layout Plan Sheet 16)** The northbound bus stop that is currently located between Elizabeth St and Spring St outside the Fire Station has been removed. This bus stop is used by routes 36, 41, and 81. If removed, the nearest bus stop would be 485 metres away, which is an unacceptably long distance for customers to walk. The current bus stop location and route is shown in Appendix 1. **Proposed Action/Resolution** Reinstate a northbound bus stop between Elizabeth St and Spring St		
2	**Bus stop pair at Seventh and Eighth Ave (General Arrangement Layout Plan Sheet 8 and 9)** The bus stop pair between Seventh and Eight Avenues has inadequate facilities for crossing Cameron Road. The nearest crossing points for these bus stops are Ninth Ave, 122 metres away, or Sixth Ave, 119 metres away. This will result in unacceptably long delays for bus passengers and reduce the attractiveness of using public transport. It is also likely to result in pedestrians crossing informally around 7th avenue, which presents safety risks for pedestrians. The impact on example destinations is outlined in Appendix 2. For many locations, lack of a crossing will double walk times to bus stops. This advice is in alignment with *the Draft Public Transport Design Guidelines (NZ Transport Agency, publication forthcoming 2021)* which state "Ideally, a crossing facility is provided in		

	close proximity (100m) of a bus stop, irrespective of if the crossing is controlled or uncontrolled." **Proposed Action/Resolution** **Option A:** Install a mid-block pedestrian crossing between Seventh and Eighth Avenue OR **Option B:** Move the bus stop pair at Seventh and Eighth Avenue to be immediately north of the intersection of Cameron and Ninth Avenue. This would also require moving the bus stop pair between Ninth and Tenth Avenues southward to maintain even bus stop spacing.		
3	**Treatment for eastern cycle path at high-use driveways (Main Works Construction Details Sheet 9)** Driveways are a conflict point between cyclists and motor vehicle users. The risk of a crash or near miss increases in areas with high-use driveways, high cycling volumes, and high cycling speeds. There are several high-use driveways on the east side Cameron Road that have a heightened risk of conflict, including the PAK'nSAVE supermarket, the Mobil service station, and the Countdown supermarket. While the *Main Works Construction Details* document states that speed cushions will be provided at high use driveways, it is unclear if other recommended treatment elements have been included. These additional recommended treatment elements include: limit line, bi-directional cycle signs (WU61) facing vehicles exiting, and green bar markings that extend to the full width of the driveway. **Proposed Action/Resolution** Ensure that the design is consistent with the recommendations outlined in *High-use Driveway Treatment for Cycle Paths and Shared Paths* (NZ Transport Agency, 2019).		
4	**Bus stop bypass design (Main Works Construction Details Sheet 4)** The *Main Works Construction Details* document outlines a bus bypass design that has cyclists and pedestrians using a shared path behind a kerbside bus stop and shelter. This type of design is not in alignment with *the Draft Public Transport Design Guidelines (NZ Transport Agency publication forthcoming 2021)* **Proposed Action/Resolution** **Option A (preferred):** Revise the design to reflect the recommended bus bypass design for two-way cycle paths outlined in *the Draft Public Transport Design Guidelines (NZ Transport*		

	Agency, publication forthcoming 2021). These are shown in the Appendix. Under this scenario, minimum footpath and cycle path widths must be achieved for safe operation. OR **Option B:** If a shared space type design is used at bus stops, the shared area should be painted with red paint to alert users that it is a conflict area. An example is shown in Appendix 4.		
5	**Crossing design** The design uses a two-way cycle path on the eastern side of Cameron Road. Due to this design and the large, divided nature of the corridor, cyclists will need to use the provided crossing facilities to move between the cycle path and destinations on the western side of Cameron Road. The *Cycling Network Guidance (Waka Kotahi)* states that "segregated crossings are more appropriate where there are high volumes of pedestrians and/or cyclists. They also allow for the shorter signal phase for cyclists to run separately from the pedestrian signal phase, thereby reducing the delays to drivers." Given that the route is central to the local walking and cycling network, a segregated crossing is likely to provide an improved crossing environment for pedestrians and cyclists. **Proposed Action/Resolution** **Option A (Preferred):** Use segregated crossings with a straight cycle crossing, staggered pedestrian crossing and separate pedestrian and cyclist phase lengths. If possible, implement a raised platform type design to improve the crossing experience for pedestrians and cyclists. An example of this type of design is shown in Appendix 5. OR **Option B:** Use segregated crossings with staggered crossings for both pedestrians and cyclists. If possible, implement a raised platform type design to improve the crossing experience for pedestrians and cyclists. An example of this type of design is shown in Appendix 5.		
6	**Footpath width on eastern side** The current designs include a minimum footpath width of 2.4 metres on the eastern side, with a footpath that is located adjacent to retail frontage on several blocks of Cameron Road. This is an inadequate footpath width, considering that the area is an activity street		

	with retail activity and a large number of bus routes, and is targeted for future development. **Proposed Action/Resolution** Ensure that the design meets the recommended footpath dimensions outlined in the *Pedestrian planning and design guide (NZ Transport Agency 2009)*. These are shown in Appendix 6.		
7	**Allocation of road space to general traffic** We have not seen the modelling work that accompanies this design but note that a key element of the Cameron Road design is the decision to allocate two 3-metre-wide lanes to general traffic and one 3.2-metre-wide bus lane / off-peak parking lane in each direction of travel. This decision has several implications for the project: ● Reduced pedestrian level of service o Pedestrians must cross six traffic lanes with a total width of 18.4 metres when crossing Cameron Road. This will reduce the attractiveness of crossing the road and may dissuade some users from making walking trips and bus trips due to large crossing distances. ● Reduced safety benefits o Several studies have demonstrated that increased road widths and traffic lanes are associated with increased crash rates, and road diets that reduce the number of vehicle lanes, usually from 4 lanes to 2 lanes and a turning lane, reduce crashes. A review undertaken by the US Federal Highway Administration synthesized the literature and concluded that in urban areas, road diets can be estimated to reduce crashes by 19%, with crash reduction factors as high as 47% in some cases. Retaining four general traffic lanes represents a loss opportunity to improve safety outcomes. ● Constrained corridor width available for walking and cycling infrastructure		

	o There is limited remaining corridor width available for walking and cycling infrastructure has resulted in a design with a minimum footpath width of 2.4 metres and a minimum two-way cycling path of 3.0 metres. The Cameron Road project will increase road capacity by removing buses from general traffic lanes, removing conflicts with parked cars during peak times, and by implementing left-in-left out turning controls at many intersections and driveways. The *Guide to Traffic Management Part 3: Transport Study and Analysis Methods (Austroads, 2020)* outlines mid-block capacity for urban arterials with interrupted flow. According to the *Guide*, the Cameron Road project can be expected to increase road capacity from around 1600 vehicles per hour to 2000 to 2200 vehicles per hour per direction. Furthermore, projected traffic volumes for 2028 indicate that two lanes of traffic in each direction is not required along the length of the project. Estimated peak traffic volumes and lane capacity are outlined in Appendix 7. From 11th Avenue to Elizabeth St, one traffic lane per direction is sufficient to accommodate demand. One other sections of the corridor, only moderate levels of traffic reduction (either through mode shift or re-routing to other corridors) would be required for effective one lane operation per direction. **Proposed Action/Resolution** **Option A (Preferred):** Revise the design to reduce general traffic lanes from two lanes to one lane per direction from Wharf Street to Eleventh Avenue, as projected 2028 traffic volumes indicate that one lane per direction is sufficient to accommodate 2028 general traffic volumes. From Wharf Street to Eleventh Avenue, use the additional space available to increase space allocation for pedestrians, cyclists, and green space. OR **Option B:** Use the construction period of any enabling works to trial one lane operation per direction for general traffic. If the trial is successful, revise the design to reduce general traffic lanes and increase space allocation for pedestrians, cyclists, and green space.		
8	**Provisions for buses turning right onto Elizabeth Street**		

	Most northbound buses travelling on Cameron Road turn right onto Elizabeth Street. This manoeuvre requires moving from a kerbside bus lane across two lanes of general traffic to a centre right turn lane. Crossing two lanes of general traffic without bus priority will cause delays for bus passengers. **Proposed Action/Resolution** Install a pedestrian signal with a bus queue jump between around 1st and 2nd Ave, somewhere after the bus stop beyond Third Ave. This will significantly reduce delays to bus passengers by eliminating conflict with general traffic and allowing buses to arrive first to the Elizabeth St intersection. It also provides a benefit of improved pedestrian access provided by an additional crossing point. A further explanation is provided in Appendix 8.		
9	**Bus priority measures at Eleventh Avenue intersection (General Arrangement Layout Plan Sheet 7)** At the Eleventh Avenue intersection, there are very high left turning volumes on the southern approach, with 590 left turning vehicles per hour projected for the PM peak in 2028. The proposed design separates left turning vehicles from buses, which have their own through lane. However, general traffic going straight through the intersection may use the bus lane as the bus priority at the intersection is unclear, only being marked with a green lane line. **Proposed Action/Resolution** In the bus lane on the south approach to the intersection, add a bus lane symbol immediately before the white limit line.		
10	**Entry and exit points to eastern bi-directional cycle path for cyclists (General Arrangement Layout Plan Sheet 1 and 16)** The current design uses a bi-directional cycle path on the eastern side of Cameron Road. For this type of design to function successfully, cyclists travelling northbound must be able to safely and conveniently transition from the Western side of Cameron Road to the bi-directional path on the eastern side at the beginning and end of the bi-directional path. **Proposed Action/Resolution** At the Spring Street Intersection (Sheet 16), implement a segregated cycle and pedestrian crossing with a cycle call button and cyclist signal phase. At the 17th Avenue intersection, implement a diagonal crossing from the southwest to northeast side to allow cyclists		

	travelling northbound to enter the bi-directional cycle facility. An example of this type of design is provided in Appendix 10.		
11	**Lane allocation and bus priority measures at Fifteenth Avenue intersection (General Arrangement Layout Plan Sheet 3)** The current design proposes the following lane allocation for Cameron Rd at Fifteenth Ave: a shared left turn lane and bus lane, two through lanes, and one right turn lane. The design for the southern approach is out of alignment with traffic flows: more vehicles turn left than go straight through, but there is one left turn lane and two through lanes. The design also lacks any priority measures for buses at the intersections as buses share a lane with left turning traffic and there is no signal priority for buses. There are projected to be 822 left turning vehicles on the southern approach and 356 left turning vehicles on the northern approach during the PM Peak in 2028. Buses will face significant delays at the intersection due to these large volumes of general traffic turning left onto Fifteenth Avenue. **Proposed Action/Resolution** Revise the lane allocation as follows: one left turn lane, one bus lane, a through lane, and one right turn lane. Vehicles per lane approach for the current and alternative lane allocation are shown in Appendix 11.		

Appendix

1. Appendix Northbound bus stop between Elizabeth St and Spring St

Figure 1: Bus routes for Route 36, 41, and 81

2. Bus stop pair at Seventh and Eighth Ave

Figure 2 below outlines the walking route taken to the northbound bus stop for a residential location east of Cameron Road. The lack of a direct crossing facility near the bus stop nearly doubles the bus stop passenger's walking time, from 2.7 minutes to 4.9 minutes, before accounting for delays caused by waiting at traffic signals. Figure 3 below outlines the walking route taken to the southbound bus stop for a work location west of Cameron Road. The lack of a direct crossing facility near the bus stop nearly doubles the bus stop passenger's walking time, from 2.7 minutes to 4.9 minutes, before accounting for delays caused by waiting at traffic signals. Calculations for both examples are outlined in Table 1.

Figure 2: Example A: Residential location east of Cameron Road

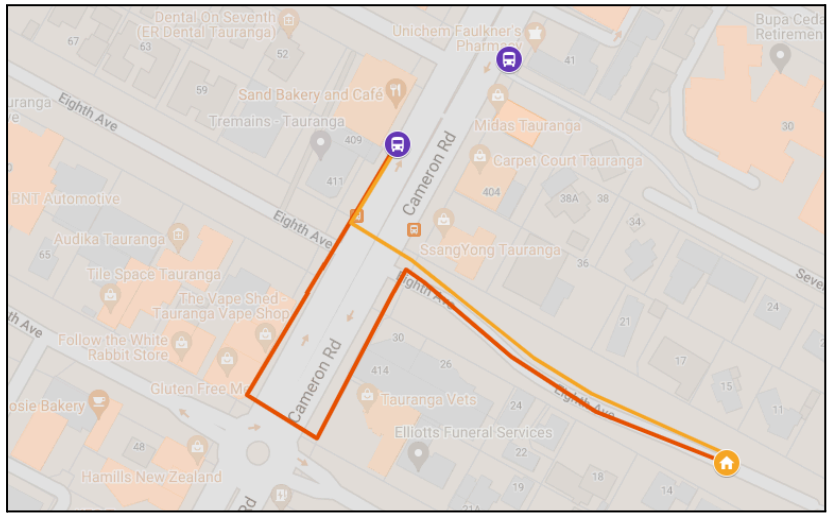


Figure 3: Example B: Work location west of Cameron Road

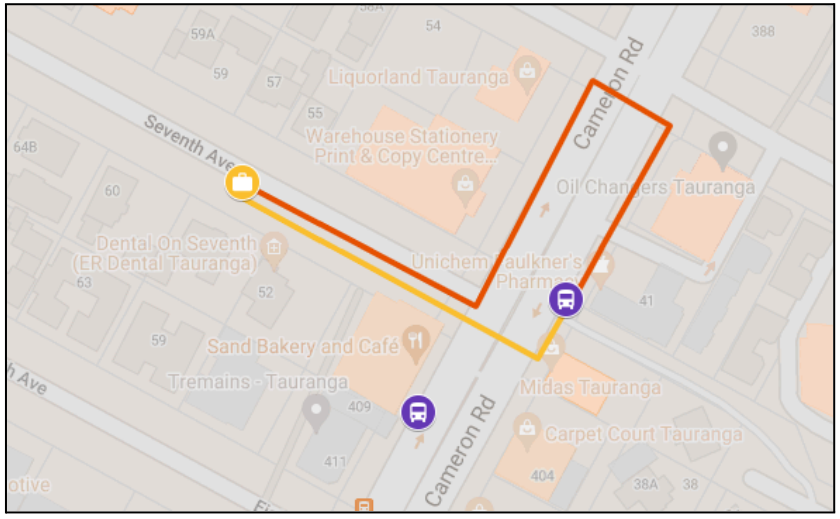
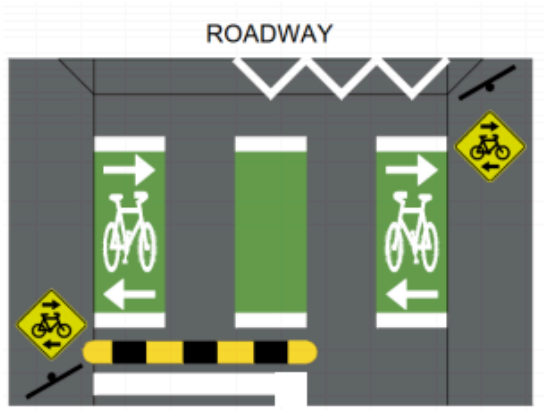


Table 1: Impact of crossing location on walking distances

	Example A: Residential location east of Cameron Road			Example B: Work location west of Cameron Road		
	Proposed route	**Direct route**	**Delay**	**Proposed route**	**Direct route**	**Delay**
Distance (metres)	413	230	183	269	136	133
Time (minutes)	4.9	2.7	2.2	3.2	1.6	1.6

3. Treatment for eastern cycle path at high-use driveways

Figure 4: Example of treatment from HIGH-USE DRIVEWAY TREATMENT FOR CYCLE PATH AND SHARED PATHS (Waka Kotahi, 2019)



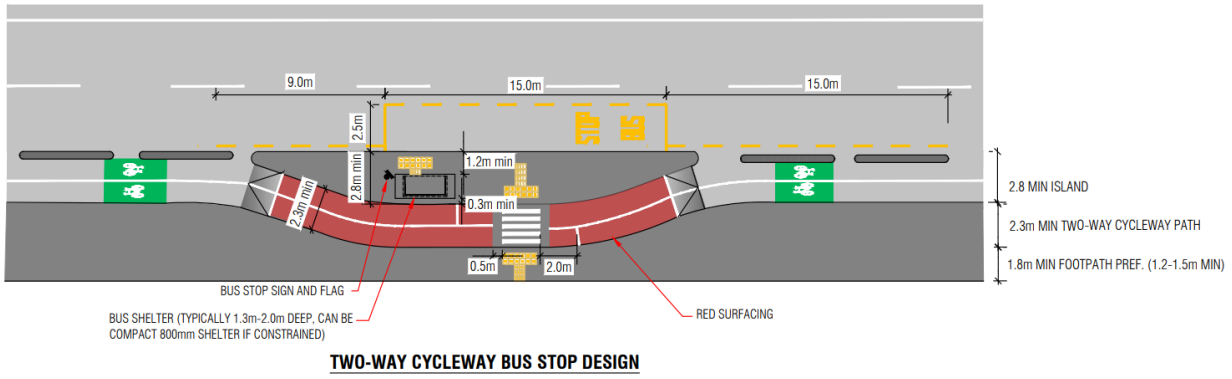
Driveway treatment solution diagram

Feature	Intuitive cue to motorist
Zebra crossing style bars	Signal that motorist must yield
Judder bar/limit line	Reinforces the need to stop and identifies ideal stopping location
Green colour	Raising expectation of a high cyclist presence
Cyclist symbol with arrows	Indicates cyclist priority use of the space, and direction of cyclist movements

Purpose of each design element

4. Bus stop bypass design

*Figure 5: Two-way cycleway bus stop design recommended by Waka Kotahi (*publication forthcoming 2021*)*



TWO-WAY CYCLEWAY BUS STOP DESIGN

NOTE: RED PAVEMENT MARKINGS ACROSS THE FULL LENGTH OF BYPASS IS OPTIONAL.
AT A MINIMUM SHOULD BE PAINTED 2.0m ON BOTH SIDES OF THE PEDESTRIAN CROSSING AND SHOULD NOT BE PAINTED UNDER THE CROSSING

Figure 6: Bus stop bypass where shared zone for cyclists and pedestrians is denoted by red stripes and painted symbols.

5. Staggered mid-block crossing design

Figure 7: Segregated crossing design proposed (Wellington)

Figure 8: Segregated Crossing Design wit straight path for cyclists (Christchurch)

6. Footpath width on eastern side

Figure 9: Minimum footpath dimensions (Pedestrian Planning and Design Guidelines, NZ Transport Agency 2009)

Table 14.3 – Minimum footpath dimensions

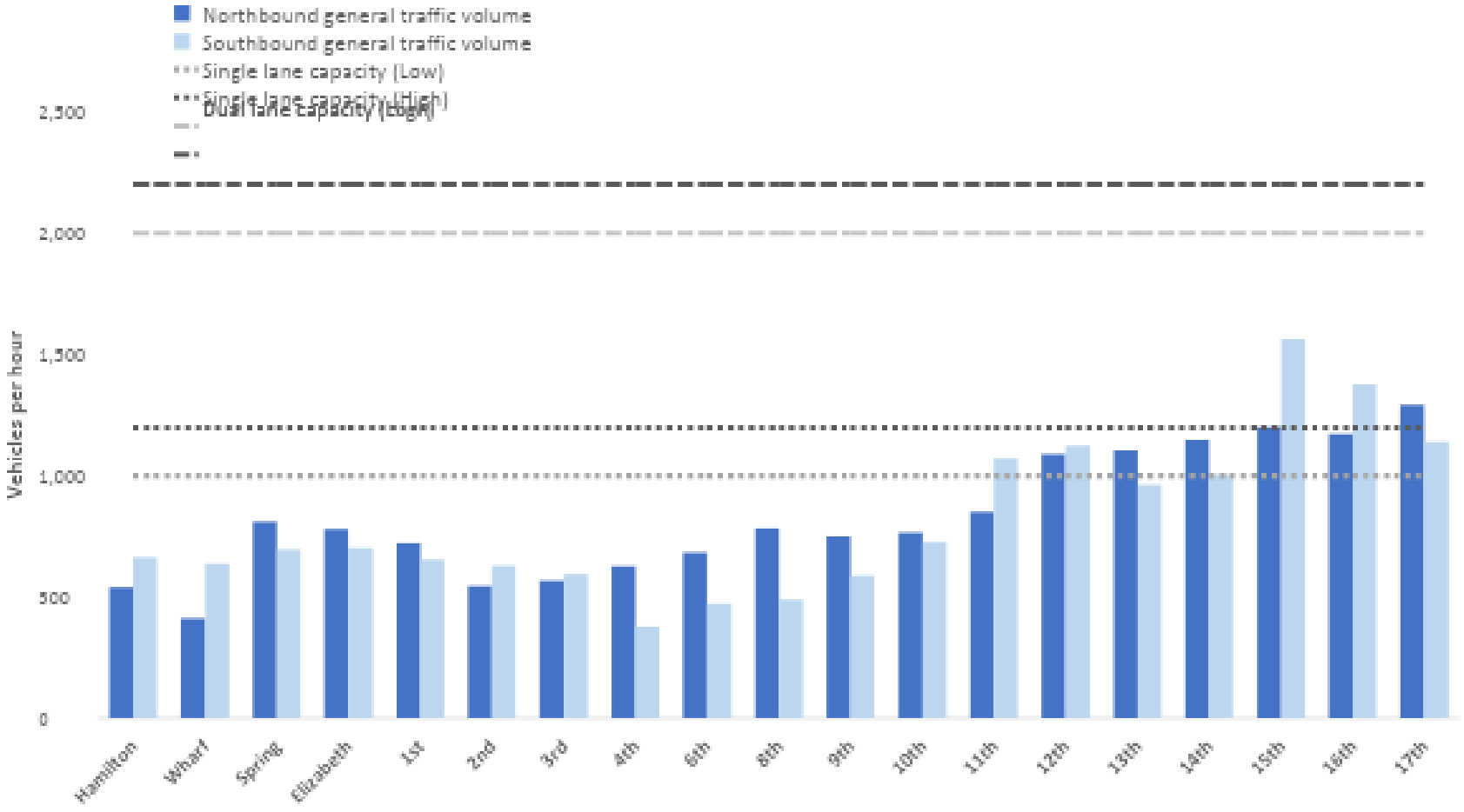
Location	Maximum pedestrian flow	Zone				Total
		Kerb	Street furniture #	Through route	Frontage	
Arterial roads in pedestrian districts	80 p/min	0.15 m	1.2m	2.4 m +	0.75 m	4.5 m
CBD						
Alongside parks, schools and other major pedestrian generators						
Local roads in pedestrian districts	60 p/min	0.15 m	1.2 m	1.8 m	0.45 m	3.6 m
Commercial/ industrial areas outside the CBD						
Collector roads	60 p/min	0.15 m	0.9 m	1.8 m	0.15 m	3.0 m
Local roads in residential areas	50 p/min	0.15 m	0.9 m	1.5 m	0.15 m	2.7 m
Absolute minimum*		0.15 m	0.0 m	1.5 m	0.0 m	1.65 m

Consider increasing this distance where vehicle speeds are higher than 55 km/h.

* Only acceptable in existing constrained conditions and where it is not possible to reallocate road space.

7. Allocation of road space to general traffic

Figure 10: ***Traffic volumes and lane capacity (2028 daily maximum)***



8. Provisions for buses turning right onto Elizabeth Street

A queue jump is a bus priority measure that where a public transport vehicle enters an intersection in advance of other traffic which reduces delays for public transport. Queue jumps be used to assist public transport vehicles in making difficult turns such as a right turn across multiple lanes of traffic. Figure 12 below shows an example from Wellington where a queue jump at a signalised pedestrian crossing allows buses to move from a left kerbside lane to a right centre lane, avoiding delays caused by conflicts with traffic. Figure 13 shows how a Queue Jump might be implemented on Cameron Road.

Figure 11: Example of queue jump in Wellington

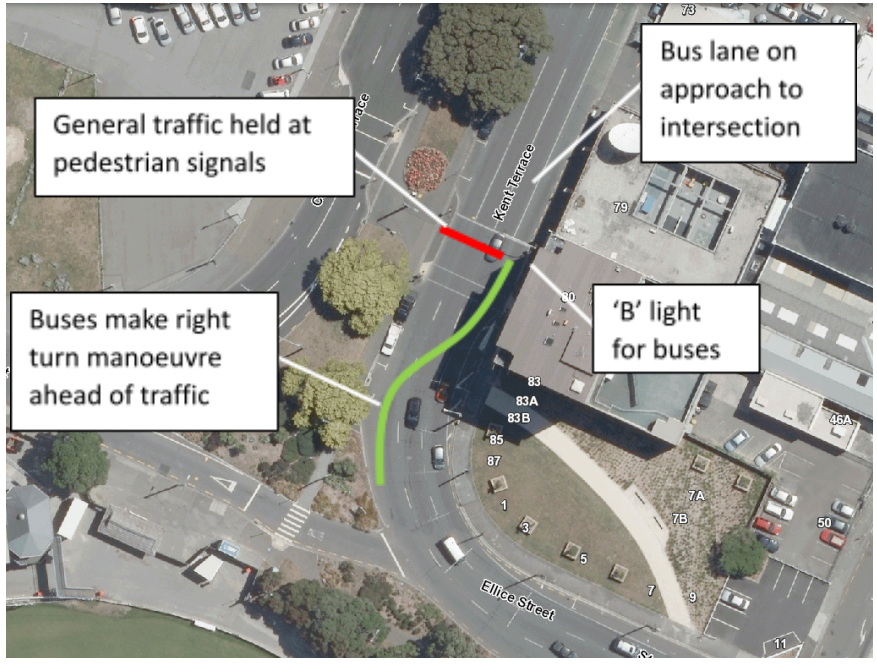


Figure 12: Proposed Queue Jump on Cameron Road

10. Entry and exit points to eastern bi-directional cycle path for cyclists

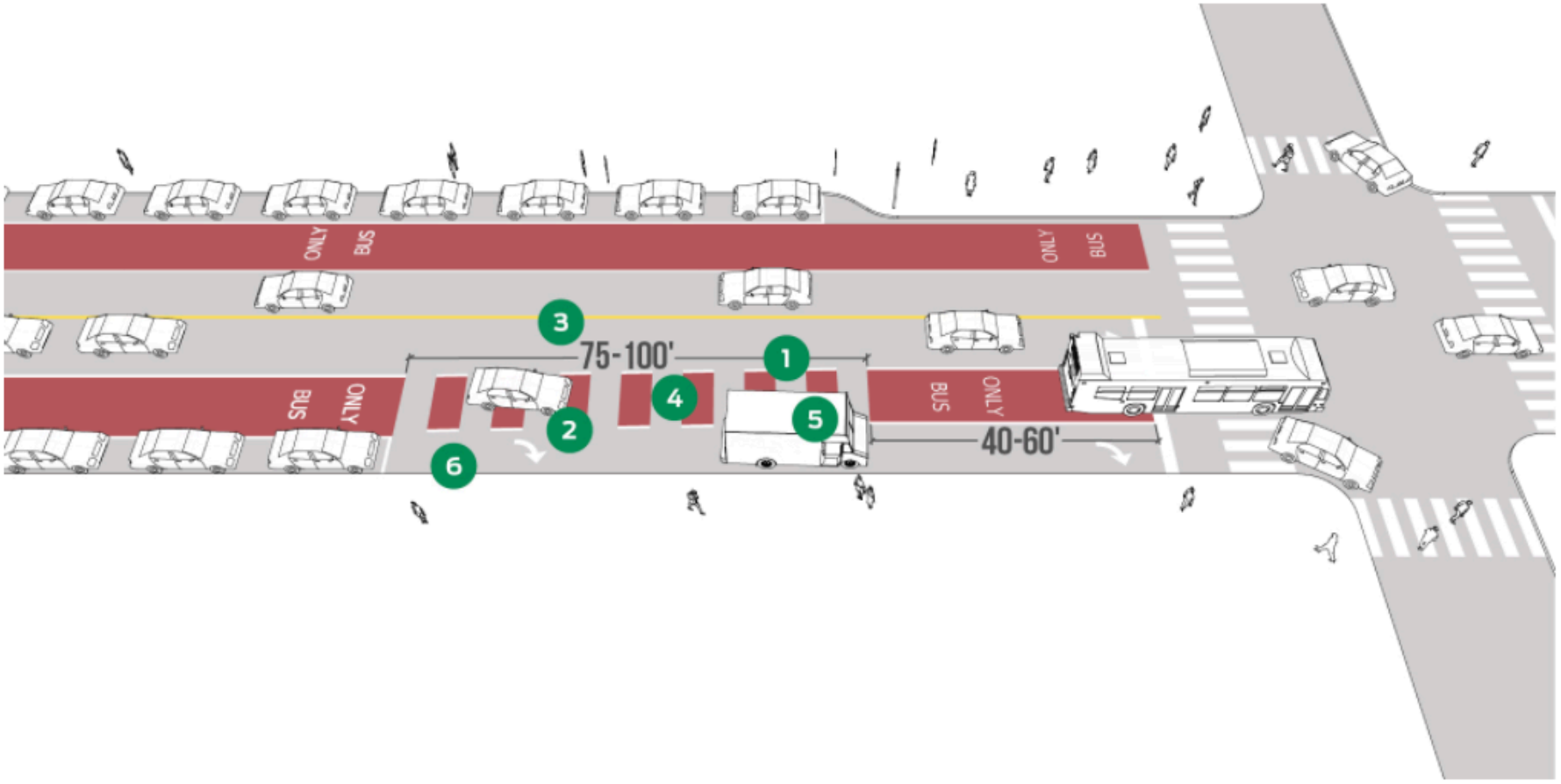
Figure 13 and 15: Diagonal cyclist crossing on Beach Road, Auckland

11. Lane allocation and bus priority measures at Fifteenth Avenue intersection

Table 2: Traffic volumes at the Fifteenth Avenue Intersection

			Number of vehicles per hour		% of approach volume	
	Approach	**Lane**	**AM Peak**	**PM Peak**	**AM Peak**	**PM Peak**
Proposed layout	N	Left + Bus lane	272	356	25%	30%
		Through	297	326	28%	28%
		Through	297	326	28%	28%
		Right	205	169	19%	14%
	S	Left + Bus lane	487	822	43%	55%
		Through	228	277	20%	18%
		Through	228	277	20%	18%
		Right	196	126	17%	8%
	Approach	**Lane**	**AM Peak**	**PM Peak**	**AM Peak**	**PM Peak**
Alternate layout	N	Left	249	344	29%	36%
		Bus lane	23	12	4%	2%
		Through	396	435	63%	71%
		Right	205	169	33%	27%
	S	Left	467	783	41%	53%
		Bus lane	20	8	2%	1%
		Through	304	370	27%	25%
		Through + Right	348	311	31%	21%

Figure 14: Bus lane separated from turning lane (NACTO)


BUS ONLY
BUS ONLY
3
75-100'
1
BUS ONLY
4
2
5
40-60'
6