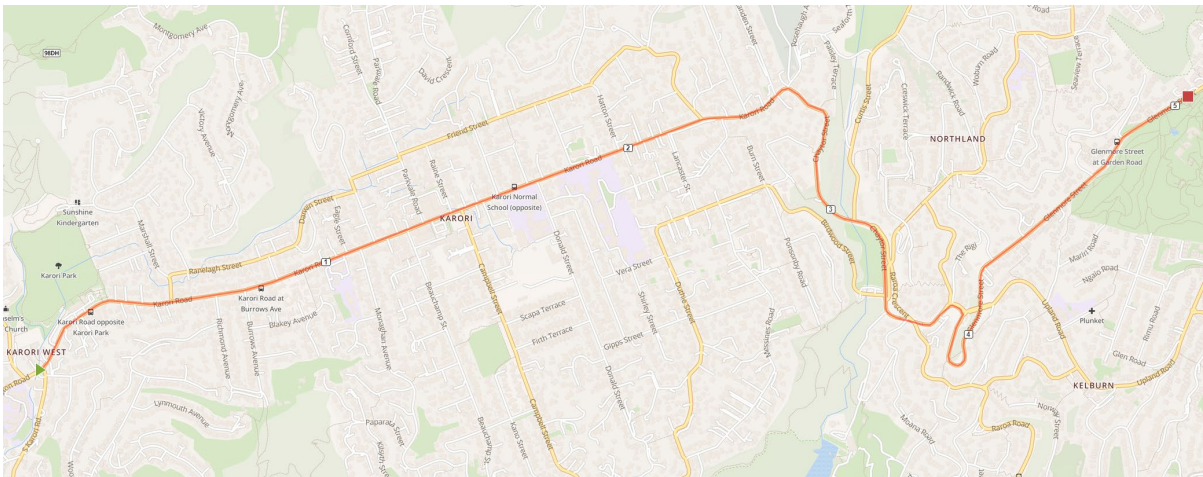




Transport Planning and Design
Level 1, 284 Kilmore Street
www.viastrada.nz

Karori 90% cycleway audit - safety and accessibility

90% design audit



Report prepared for

Paneke Pōneke
Bike network plan

Absolutely Positively
Wellington City Council
Me Heke Ki Pōneke

July 2023



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Disclaimer

The findings and recommendations in this report are based on the site visit undertaken by the cycleway audit team (CAT), an examination of available relevant plans, the specified road and environs, and the CAT's professional knowledge and experience. However, it must be recognised that no audit can guarantee the elimination of all possible safety concerns as all traffic environments consist of a multitude of elements that are never completely within the control of engineering design.

Safety and accessibility audits, by nature, focus on aspects relating to safety and accessibility and therefore do not constitute a complete review of design or assessment of standards with respect to engineering or planning documents. Similarly, the safety audit focuses on the plans provided and the relevant design stage.

This audit applies to the stated project. Whilst some issues covered are general and might be applicable to other locations, the CAT does not take any responsibility for transferral of concepts to other projects or locations.

While every effort has been made to ensure the accuracy of the report, it is made available on the basis that anyone relying on it does so at their own risk without any liability to the CAT or their organisation(s).



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1 Introduction

1.1 Brief and project description

ViaStrada (the cycleway audit team, a.k.a. CAT) have been commissioned by the client to audit for Paneke Pōneke – Wellington’s transitional cycle network. The audit is to be a combination of road safety and accessibility audits and is henceforth referred to as a CASA – i.e. “Cycleway audit – safety and accessibility”. Several CASAs will be undertaken on the various routes / packages at various design stages. The CASA process aligns with the Waka Kotahi NZ Transport Agency *Safe System audit guidelines* (2022).

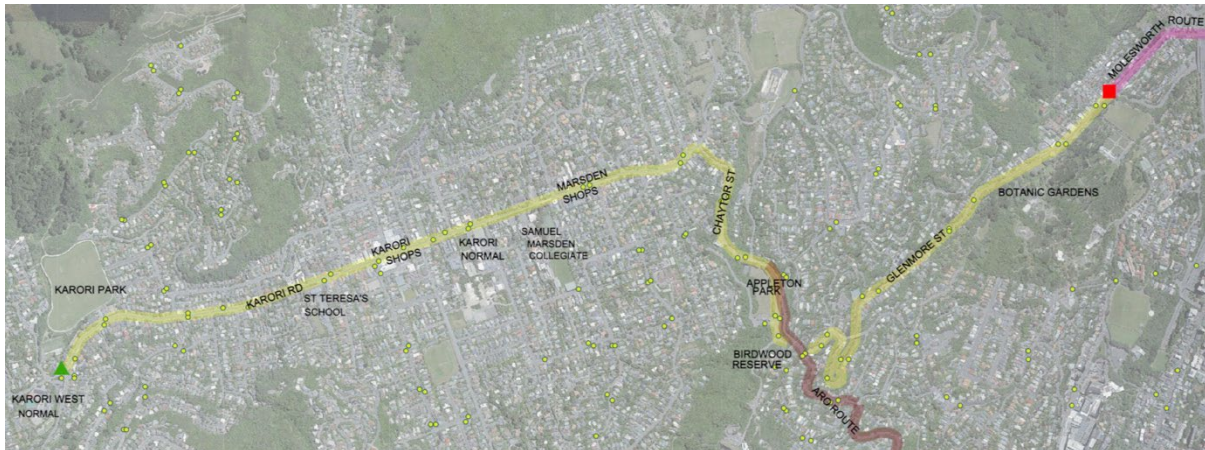


Figure 1-1: Extent of audit



Figure 1-2: Gradient of audit route (from green triangle to red square on route map)

This CASA is for the 90% design stage of the Botanical Gardens – Karori routes package, as shown in Figure 1-1. The yellow route is the subject route. It intersects with two other routes – the Aro Route and the Molesworth Route.

The infrastructure assessed in this audit includes painted markings, physically separated cycleways raised platforms, kerb changes and traffic signals (to the extent of detail provided at this 90% stage).

1.2 The cycleway audit team

The CASA was carried out by the Cycleway Audit Team (CAT) consisting of:

- Warren Lloyd, the cycleway audit team leader, of ViaStrada Ltd
- Axel Downard-Wilke, Luca Ware and Nick Reid, all cycleway audit team members, of ViaStrada Ltd



1.3 Meetings and site visits

A project briefing was conducted on Tuesday morning, 18 April 2023, prior to the site visit. The briefing meeting included a client representative and the two members of the CAT (Warren and Luca).

The daytime site visit was undertaken immediately after the site meeting between 9:00 am and 4:00 pm.

A night-time site visit was not undertaken.

1.4 Project information provided

The CAT has received the following project plans.

Table 1-1: plans and information provided

Document	Date	Description
Karori to Botanic Garden Ki Paekaka Connections WCC Transitional Cycleways	16/05/2023	30% design plans
90% TR drawings Birdwood Street, Karori traffic resolution	10/07/2023	90% design plans
90% TR drawings Braithwaite Street & Messines Street, Karori	10/07/2023	90% design plans
90% TR drawings South Karori Road, Karori	10/07/2023	90% design plans
522550-0000-drg-dgn-0101-A-signage primary route	10/07/2023	90% design plans
522550-0000-drg-dgn-0001-B-general layouts primary route	10/07/2023	90% design plans

1.5 Design vehicles

For intersections, Austroads *Guide to Road Design Part 4: Intersections and Crossings: General* (AGRD4, 2017) describes a design vehicle as the largest vehicle that can perform any turning movement¹ from the appropriate approach lane to the appropriate departure lane with adequate clearances to features such as kerbs and roadside furniture.

The CAT has assumed the following design vehicles for this project:

- 19 m semi-trailer is the maximum design vehicle expected to use roads connecting to commercial areas.
- 11.5 m rigid truck or urban bus on the main road network.
- People on bikes are anticipated to be confident riders with at least cycling competency of Grade 2 intermediate skills.
- Users of electric scooter users are present (including the current public share scooters by Beam and Flamingo). Unless otherwise specified, where an issue description refers to “cycleway users” or simply “cyclists”, this also includes users of electric scooters or other low powered electric devices.

¹ The design vehicle is anticipated to be a regular road users, while the “check” vehicle is the rare larger vehicle that must turn using more than the designated entry and departure lanes, i.e., may use the opposing traffic lane or a mountable feature of the roadside.



2 Audit procedure and report format

This audit follows the Waka Kotahi NZ Transport Agency *Safe System Audit Guidelines* (2022). The primary objective of a Safe System audit is to deliver a project that achieves an outcome consistent with the Safe System approach, that is, minimisation of death and serious injury.

The following section(s) of this report detail the issues identified in the audit.

2.1 Crash probability

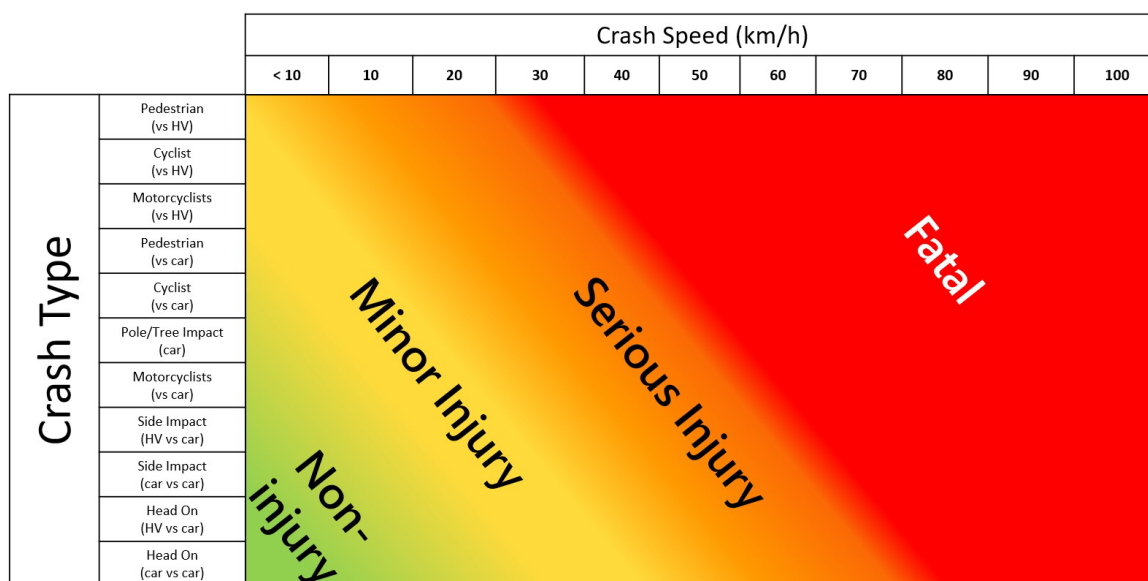
The probability of a crash is qualitatively assessed based on expected exposure (how many road users will be exposed to the site) and the likelihood of a crash resulting from the presence of the particular safety issue. Probability ranges from “very likely” to “very unlikely”, and have been based on the categories in the Austroads *Guide to Road Safety Part 6: Road Safety Audit* (2022) but adapted for the 4-tier probability structure used in the NZ guide (Waka Kotahi, 2022).

Table 2-1: Relationship between crash probability and frequency

Probability of a crash occurring	Frequency of crashes expected
Very likely	One crash every 3 months (4+ crashes / year)
Likely	One crash every 3-12 months (1-4 crashes / year)
Unlikely	One crash every 1-7 years (0.1-1 crashes / year)
Very unlikely	One crash every 7+ years (<0.1 crashes / year)

2.2 Crash severity

The expected severity outcome of a crash is qualitatively assessed based on factors such as expected speeds, type of collision, and type of user/vehicle/object involved; Figure 2-1, which is based on Austroads *Guide to Road Safety part 6: Road Safety Audit* (2022) but in colour instead of greyscale, gives an indication of the expected crash severity based on these factors. Table 2-2 describes the four crash severities used.



General indication only – professional judgement required

Figure 2-1: Expected crash severity by crash type and crash speed (adapted from Austroads GRS6, 2002)



Table 2-2: Crash severity descriptions (adapted from Waka Kotahi Safe Systems Audit Guidelines, 2022)

Severity outcome	Description
Fatal	Where Safe System boundary conditions are exceeded. A death occurring as the result of injuries sustained in a road crash within 30 days of the crash.
Serious	Where Safe System boundary conditions are exceeded. Injury (fracture, concussion, severe cuts or other injury) requiring medical treatment or removal to and retention in hospital.
Minor	Where Safe System boundary conditions are met. Injury that is not 'serious' but requires first aid, or that causes discomfort or pain to the person injured.
Non-injury	Where Safe System boundary conditions are met. Property damage crashes.

Reference to historic crash data or other research for similar elements of projects, or projects as a whole, have been drawn on where appropriate to assist in understanding the likely crash types, probability and severity that may result from a particular concern.

2.3 Crash risk rating

The probability and severity ratings are used together to develop a combined qualitative risk ranking for each safety issue using the Waka Kotahi Safety Concern Risk Rating Matrix shown in Table 2-3. The qualitative assessment requires professional judgement and experience from a wide range of projects of varying sizes and locations.

Table 2-3: Safety concern risk rating matrix (from Waka Kotahi Safe Systems Audit Guidelines, 2022)

		Severity outcome			
		Non-injury	Minor	Serious	Fatal
		Property damage only (PDO)	Injury which is not 'serious' but requires first aid, or which causes discomfort or pain to the person injured.	Injury (fracture, concussion, severe cuts or other injury) requiring medical treatment or removal to and retention in hospital.	A death occurring as the result of injuries sustained in a road crash within 30 days of the crash.
Probability of a crash	Very likely	Minor	Moderate	Serious	Serious
	Likely	Minor	Moderate	Serious	Serious
	Unlikely	Minor	Minor	Significant	Serious
	Very unlikely	Minor	Minor	Significant	Significant

Safe System injury threshold



While all safety concerns should be considered for action, the client will make the decision as to what action will be adopted. This report gives safety ranking guidance and it is acknowledged the client must consider factors other than safety alone. The suggested action for each concern category is given in Table 2-4.

Table 2-4: Concern categories

Risk	Suggested Action
Serious	Safety concern that must be addressed and requires changes to avoid serious safety consequences.
Significant	Significant concern that should be addressed and requires changes to avoid serious safety consequences.
Moderate	Moderate concern that should be addressed to improve safety
Minor	Minor concern that should be addressed where practical to improve safety.

In addition to the ranked safety issues, it is appropriate for the CAT to provide additional comments about items that may have a safety implication but lie outside the scope of the CASA. A comment may include: items where the safety implications are not yet clear due to insufficient detail for the stage of project; items outside the scope of the audit such as existing issues not impacted by the project; an opportunity for improved safety that is not necessarily linked to the project itself, or drawing/signage issues that should be addressed but are not necessarily safety related. While typically comments do not require a specific recommendation, in some instances suggestions may be given by the CAT.

2.4 Recommendations














Each issue is accompanied by a list of recommendations to address the issue. As per the safe systems framework, these are classified as relating to either:

- Primary treatments – i.e. those capable of virtually eliminating death or serious injury resulting from the particular safety issue; or
- Supporting treatments – reduce the overall harm caused by the safety issue.

2.5 Affected user groups

For ease of interpretation, each issue heading in this CASA report includes the severity rating, as well as include letters to denote the main user groups affected. The first row in the table also includes icons to denote possible sub-groups. The user letters and icons are presented in Table 2-5.

Table 2-5: User groups included

Main user group	Heading letter	Possible sub-groups
Pedestrians	P	Vision impaired pedestrians 
		Mobility impaired pedestrians 
		Wheelchair users 
		Bus patrons (waiting / alighting) 
		All pedestrians 
Cyclists	C	Enthusied & confident cyclists 
		Interested but concerned cyclists 
		Cyclists using electric bikes 
		All cyclists 
E-scooter / device users	E	E-scooter users; other electric small-wheeled devices 
Motorists	M	Drivers 
		Buses 
		Motorcyclists / moped users 

Section 5 presents a summary of the issues identified and the audit statement to be signed by the designer, responding auditor, safety engineer, project manager and project sponsor.



2.6 Project team response process

In accordance with the procedures set down in the Waka Kotahi NZ Transport Agency *Safe System Audit Guidelines* (2022) the audit report will be submitted to the client who will instruct the wider project team to respond.

No changes, however small they may appear, may be made to any of our writings in the main audit section of our report without our express review and consent. This restriction includes our CAT responses.

We do not consent to any changes ... to be made to the main audit section of our report.

The safety issues raised in this audit will require responses from the designer and, after the CAT has had a chance to clarify issues further, the project safety engineer. Finally, the client decision and action taken against the safety issues will also be recorded.

The following people have been identified by the client for these roles (Table 2-6).

Table 2-6: project team members relevant to this audit (to be completed by the client)

Role	Name	Organisation
Designer response	Greg Murison	Future Group
Safety engineer	Dennis Davis	Wellington City Council
Client decision		
Action taken by		

3 Crash history

See previous 30% design stage audit report dated 11 June 2023 for crash information.

4 CASA findings – project wide

Detail sheets were referenced throughout, but were not found in the received files.

Many sheets mention Karori Street when it should be Karori Road.

4.1 Sharrows inconsistency and transitions unclear – C

Firstly, some sharrows are white only while others are green backed.

Secondly, there is a lack of consistency and clarity in transitions from separated cycleways to mixed traffic lanes. Sharrows should taper across the road over a set distance, rather than suddenly appear in the middle of the mixed traffic lane. This is evident on Braithwaite Street, on the approach to Upland Road, 2 Homewood Avenue (opposite 123 Karori Road), etc. This has been raised as a safety issue once (refer to section 5.5) but if agreed by the client and designer should be checked and revised throughout.

Comment



Probability of crash occurring	Very unlikely
Expected crash severity	N/A
Primary treatment recommendations:	
4.1.1	N/A
Supporting treatment recommendations:	
4.1.2	Mark all sharrows with green backing
4.1.3	Install sharrows in a taper fashion between cycleways and mixed traffic environments

Responses:

Designer	4.1.2; 4.1.3: No design response. WCC preference for sharrows with green back to be included only at transitions non-green back throughout as typically used. Tapering of sharrows across roadway is subject to Waka Kotahi updates on sharrow marking guidance.
Safety Engineer	Agree with CAT recommendations. Consistency of the markings is important. I recommend that sharrows be installed with green backing, and in a taper fashion at transitions from cycleways to mixed traffic lanes.
Client decision	Sharrows be installed with green backing at transitions from cycleway to mixed traffic lanes.
Action taken	

4.2 Unnecessary signage – P

Opposite property number 30 Glenmore Road, Chaytor Street Part 2 exiting Appleton Park, and Karori Street Part 6, the signage plan set indicates a new cycle lane sign. As per the TCD Rule 7.12, regulatory signs are no longer required to indicate an exclusive cycle lane if a marking is used instead. Signs are costly, contribute to street clutter, reduce the available footpath width, and do not contribute to road user behaviour change where there are physical cycle lane separators. In very rare situations, vision impaired pedestrians may collide with sign poles. There is therefore a need to reduce the number of signs wherever possible.

The first cycle symbol is about 75 m downstream, with the previous cycle symbol about 40 m upstream.



Figure 4-1: cycle lane sign is judged to be unnecessary

Comment



Probability of crash occurring	N/A
Expected crash severity	N/A
Primary treatment recommendations:	
4.2.1	N/A
Supporting treatment recommendations:	
4.2.2	Consider deleting the proposed cycle lane sign in favour of an additional cycle symbol.

Responses:	
Designer	Noted, signs will be removed.
Safety Engineer	Agree with CAT and Designer’s response.
Client decision	Agree with above.
Action taken	Signs removed from plans and pavement marking added.

5 CASA findings – site specific safety issues

5.1 Kerb ramp to nowhere opposite 30 Glenmore Rd – **P**

Significant

Opposite property number 30 Glenmore Road, the signage plan set indicates a new kerb ramp aka pram crossing (shown in red circle in screen snip below) that does not lead anywhere. There is another kerb ramp proposed to serve the mobility parking which appears appropriate. Because this kerb ramp is not shown in the main plan set, it is assumed to be a draughting error. If left in the plans and constructed, it could be a significant safety issue for vision impaired pedestrians.

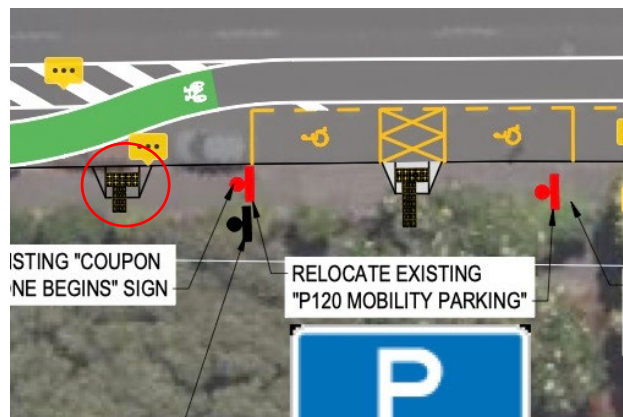


Figure 5-1: pram crossing with unknown purpose (in red circle)



Probability of crash occurring	Very unlikely
Expected crash severity	Serious injury
Primary treatment recommendations:	
5.1.1	Remove the unnecessary proposed kerb ramp and tactiles.
Supporting treatment recommendations:	
5.1.2	N/A

Responses:

Designer	Noted, kerb ramp and tactiles will be removed.
Safety Engineer	Agree with CAT and Designer's response.
Client decision	Remove kerb ramp.
Action taken	Kerb ramp removed.

5.2 Lane widths at bus stop 4316 The Rigi – C

The CAT has assessed the lane widths and potential for a pinch point for downhill cyclists at bus stop 4316 The Rigi.

While a 1.42 m pinch point between a stopped bus and the flush median does develop, it is not anticipated that any motor traffic will be stopped in that flush median. This bus stop arrangement is judged to be not a safety issue. This assessment is included in the event a reader questions whether an assessment has been undertaken.

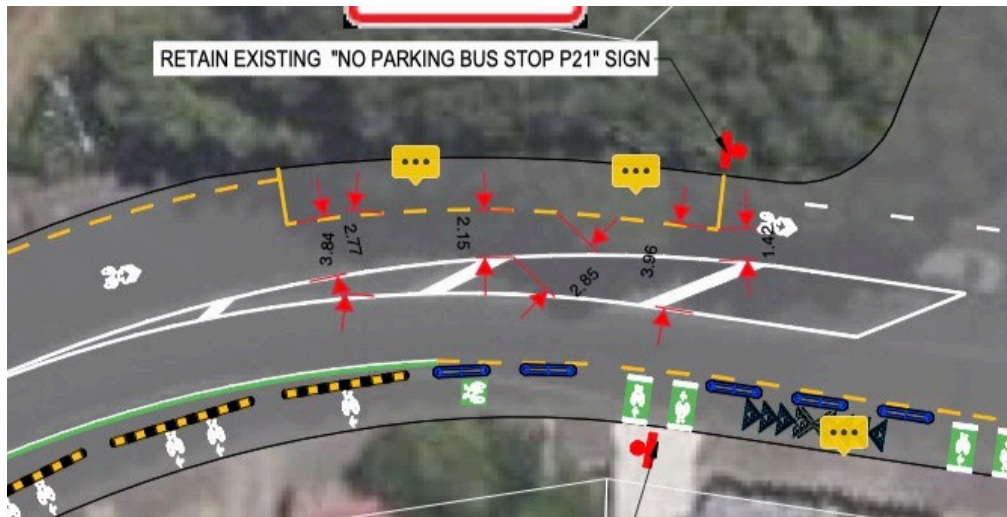


Figure 5-2: Bus stop 4316 is judged to not be a safety issue

Comment



Probability of crash occurring	N/A
Expected crash severity	N/A
Primary treatment recommendations:	
5.2.1	N/A
Supporting treatment recommendations:	
5.2.2	N/A

5.3 Kerb ramp blocked near Upland Road – **C P**

Significant



An existing kerb ramp marked for cyclist use may have been installed to aid wheeled pedestrians in crossing the road (as there is only a footpath on one side). Safety issues include:

- the kerb ramp on the service station side (if present) may be blocked by parked cars, meaning wheeled pedestrians trying to travel along Glenmore Street may not be able to cross to the outbound bus stop (or vice versa);
- The kerb ramp on the opposite side would now be blocked by the last separator, marooning a wheeled pedestrian in the carriageway; and
- the last separator is too close to the intersection, so a confident rider has less time to exit the separated cycleway and merge with traffic.

The crash types expected include:

- sideswipe crashes between cyclists and motorists;
- wheeled pedestrians being struck by another road users if prevented from exiting the carriageway; and
- loss of cyclist control if pinched to the kerb when trying to merge.

The risk factors are: density of traffic; presence of parked vehicles.

The relevant standards or guidance are:

- cycle lanes should terminate 30 m before a roundabout as per the CNG and TCD Manual Part 4 section 5.4.5
- there should be a kerb ramp on each side of the road when footpaths end and restart on the other side of the road as per PNG [kerb crossings](#)

Probability of crash occurring		Very unlikely
Expected crash severity		Serious injury
Primary treatment recommendations:		
5.3.1	Maintain crossing pedestrian access to kerb ramp on inside of curve by omitting last separator	
5.3.2	Ensure that there is an accessible kerb ramp not blocked by carparking on the opposite side (the service station side)	
Supporting treatment recommendations:		
5.3.3	N/A	

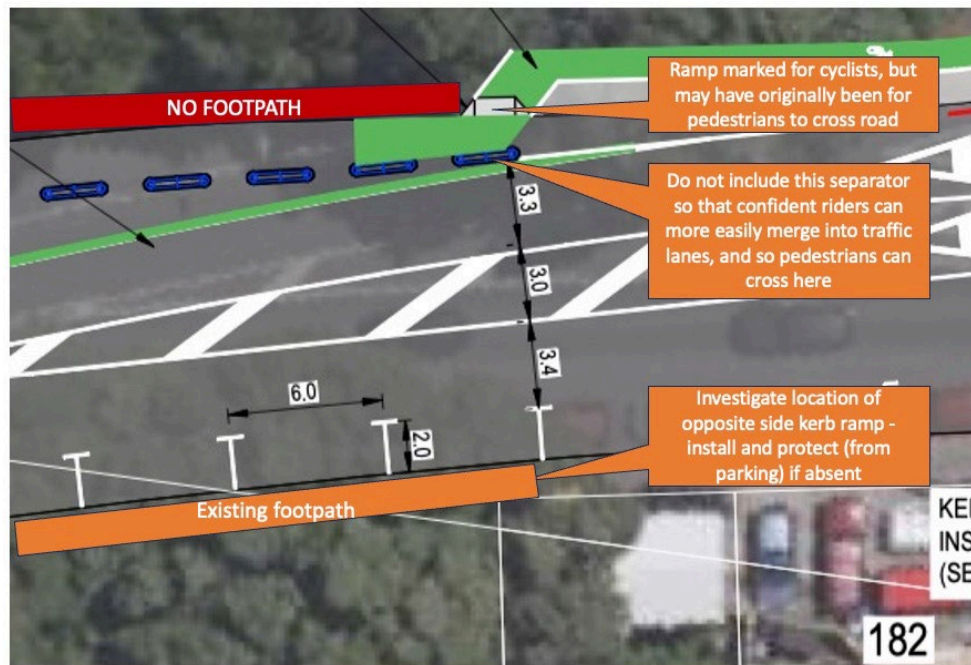


Figure 5-3: kerb ramp and separator layout opposite property 182

Responses:	
Designer	5.3.1. Last separator to be omitted. 5.3.2. Client has noted that a kerb ramp on the service station side will not be included as part of the Transitional Cycleway project but may be included later as part of the Transformational cycleway Programme.
Safety Engineer	Agree with Designer's response. The Project Manager should ensure that this information on the outstanding missing ramp is retained and accessible for the future transformational team.
Client decision	Agree. Remove separator and inform transformation team on future kerb ramp.
Action taken	Separator removed from designs. Report for Transformational team begun.

5.4 Unclear transition cycleway to roundabout – C

Minor

The separated cycleway has a decision point at its terminus – a shared path ramp for less confident riders and those proceeding to turn left, and a sharrow marking for those more confident riders and those turning right into The Rigi.

The safety issue is that there are no transitional sharrows between the end of the cycleway and the limit line, and motorists may not expect a rider to suddenly merge when there is green paint and an obvious cycle route on the path.

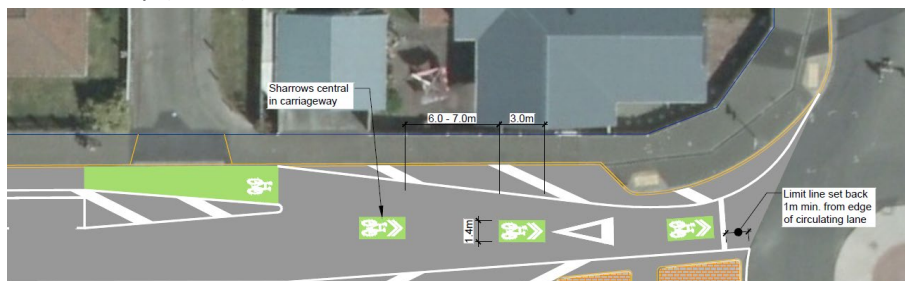
The crash type/s expected is sideswipe.

The risk factors are volumes of confident and/or right turning cyclists and motorists.



Figure 5-4: confident riders are unsupported in making transition to mixed traffic

Figure 5-5 shows the current thinking on best practise for a kerbside cycle transition on the approach to a roundabout, with sharrows in green boxes as agreed by the Active Modes Infrastructure Group (AMIG).



Probability of crash occurring	Very unlikely
Expected crash severity	Minor injury
Primary treatment recommendations:	
5.4.1	N/A
Supporting treatment recommendations:	
5.4.2	Provide additional green backed sharrow(s) between the end of the cycleway and the sharrow at the limit line.
5.4.3	Develop a consistent marking plan – some sharrows are green backed and some are not.



Figure 5-5: AMIG-approved transition from cycleway to mixed traffic lane

Note that the sharrows are placed to encourage riders to adopt a safer central lane position (refer Austroads AP-R461-14) and to build awareness and legitimise such riding behaviour in the eyes of motorists.

Transition markings that are ambiguous or inconsistent between sites could result in confusion between users and the occasional conflict. As motorists would generally be travelling lower than 30 km/h in the approach to a roundabout, such crashes would be likely to result in minor injury.

Responses:	
Designer	5.4.2. Noted, additional sharrows to be included. 5.4.3. No design response. WCC preference for sharrows with green back to be included only at transitions non-green back throughout as typically used.
Safety Engineer	Agree with CAT and Designer’s response.
Client decision	Agree with designer and safety engineer.
Action taken	Designs change to include additional sharrows.

5.5 Segregated path near Upland Road – P C

Comment

The designer has proposed a retaining wall to widen the existing footpath to a 2.5 m wide shared path with paint segregation. Some comments:

- The paint separation is not likely to work in practice
- It is understood that the paint separation is intended as a minor aid for people with vision impairment, and therefore it is not seen as a safety issue or harm to include, although the cost/benefit ratio for paint separation is likely to be low
- The widening is worthwhile for the interested but concerned cyclist who would not want to ride on the carriageway
- The number of pedestrians using this segment is expected to be very low so a 2.5 m shared path without paint separation should be adequate
- The plan callouts jumble terminology e.g. “shared footpath”

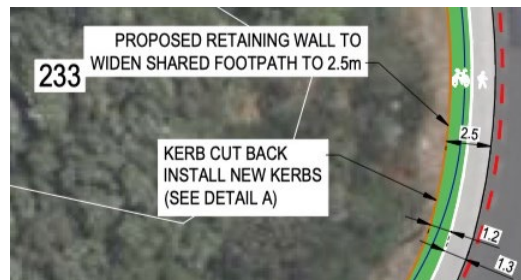


Figure 5-6: proposed segregated path on inside of curve near Upland Road



Probability of crash occurring	N/A
Expected crash severity	N/A
Primary treatment recommendations:	
5.5.1	N/A
Supporting treatment recommendations:	
5.5.2	For clarity, the designer should update the callouts to reference the existing footpath and the proposed shared path

Responses:	
Designer	Design to revert to a shared path instead of a segregated path.
Safety Engineer	Agree with CAT and Designer’s response.
Client decision	Agree with all.
Action taken	Design now shows it as a shared path.

5.6 Cycleway re-entry to carriageway angle too steep – C

Significant



The design for the re-entry to carriageway opposite 196 Glenmore Street and 94 Karori Road shows a kerb ramp leading onto the RSP ramp. This kerb ramp should be oriented towards the direction of travel for a cyclist, using the kerb extension as a “shield” from motor traffic in the lane to be re-entered. The safety issue is that if the alignment is constructed as designed, a cyclist will re-enter the carriageway in conflict with a motorist. Cyclists would then be directed into the bus stop space, but this is a relatively uncommon confluence of events and a rider is much more likely to be able to avoid a collision ahead than coming from behind.

The crash type/s expected to be a right-angle collision between a motorist and a cyclist.

The risk factors are the volumes of motorists and cyclists. Wet weather and darkness will increase the likelihood of a collision.

The relevant guidance is TCD Manual Part 4, although no specific angle of re-entry ramp is listed in New Zealand documents. Our experience is that the angle should be 70 degrees.

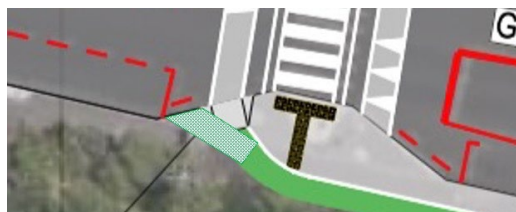


Figure 5-7: proper alignment of return to carriageway minimises turning angle shown with stippled green polygon

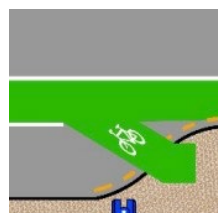


Figure 5-8: clip from figure 8-5 of TCD Manual Part 4

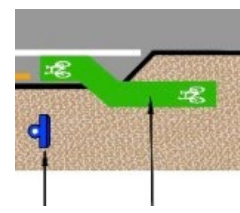


Figure 5-9: clip from figure 5-2 of TCD Manual Part 4

Probability of crash occurring		Very unlikely
Expected crash severity		Serious injury
Primary treatment recommendations:		
5.6.1	Eliminate the conflict point by realigning the kerb ramp as illustrated	
Supporting treatment recommendations:		
5.6.2	N/A	

Responses:	
Designer	Noted. Kerb ramp to be realigned.
Safety Engineer	Agree with CAT and Designer’s response.
Client decision	Agree with all.
Action taken	Angle of kerb ramp realigned in the latest design.

5.7 Incorrect line edgeline marking Glenmore at Waiapu Rd – P C E M
Comment

The edgeline is shown as a continuous white line. Road users are not intended to cross solid white lines. For legibility, the edgeline should be omitted and linemarking designed as per TCD Manual Figure 4-22 (although NZ guidance is not very clear on this point).

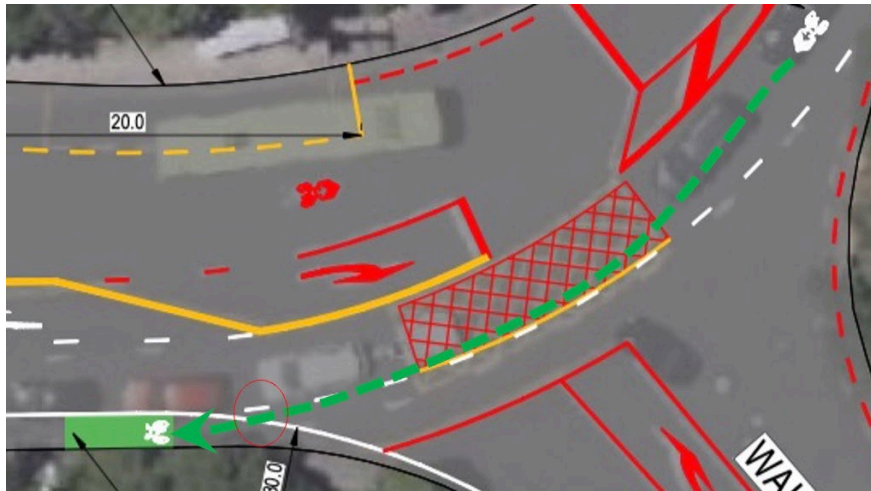


Figure 5-10: clip from design plan; green dashed line shows cyclist trajectory



Probability of crash occurring	Choose probability
Expected crash severity	Choose severity
Primary treatment recommendations:	
5.7.1	N/A
Supporting treatment recommendations:	
5.7.2	Omit white edgeline at Waiapu Rd

Responses:

Designer	Noted. Amendment to be made.
Safety Engineer	Agree with CAT and Designer's response.
Client decision	Agree with all.
Action taken	Design updated to eliminate kerb line.

5.8 Entry to Appleton Park shared path – P C
Minor

The safety issue is that there are multiple physical hazards at the proposed shared path entrance point to Appleton Park and none seem to be acknowledged or mitigated in a 90%



design plan. Riders may also not know where they are going or why they are being directed from the carriageway to a pathway, leading to further potential conflicts due to unexpected braking or change of direction.

The crash type/s expected include cyclists hitting fixed objects or pedestrians.

The risk factors are volumes of path users and darkness.

The relevant standards are the CNG and PNG.

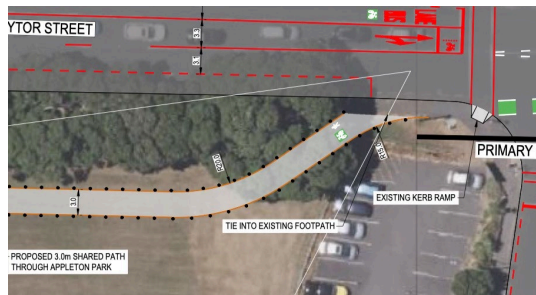


Figure 5-11: the 90% design plan offers no details on the shared path at the Chaytor / Birdwood intersection



Figure 5-12: there is a multitude of constraints from poles to bus shelters that will create conflicts

Probability of crash occurring	Very unlikely
Expected crash severity	Minor injury
Primary treatment recommendations:	
5.8.1	Detail how the shared path will be safely integrated with the existing infrastructure in Appleton Park
Supporting treatment recommendations:	
5.8.2	Include wayfinding signage, possibly in lieu of the rather unnecessary cyclists use ramp sign.

Responses:	
Designer	5.8.1. Noted, will be amended to reflect transition to Appleton park shared path. 5.8.2. Noted, will be amended to include wayfinding signage indicating direction through park.
Safety Engineer	Agree with CAT and Designer’s responses.
Client decision	Agree with the above responses.
Action taken	A widened kerb, green paint and wayfinding added to the designs.

5.9 Unprotected cycle lane on inside of curve – C

Significant

Opposite property number 64 Chaytor Street there is a proposed cycle lane on the inside of a tight curve. Motorists are likely to encroach on the cycle lane, both wearing the surface colour



and running the risk of hitting a cyclist from behind. However this risk is not any different than the existing situation, with the exception that the painted cycle lane may offer a false sense of security.

The crash type is rear end collision between motor vehicle and cyclist. The risk factors are darkness and traffic volumes.

Articulated buses will need to track into the cycle lane. Therefore the best mitigation may be audio tactile profiled markings (ATPMs) to keep the majority of traffic within their lane. Raised reflectorised pavement markings may be effective but not as durable.



Figure 5-13: xxx

Probability of crash occurring	Very unlikely
Expected crash severity	Serious injury
Primary treatment recommendations:	
5.9.1	N/A
Supporting treatment recommendations:	
5.9.2	Consider ATPMs to reduce incidence of motor vehicle intrusion in cycle lane.

Responses:

Designer	Noted, ATPMs will be included in this section.
Safety Engineer	Agree with CAT and Designer's response.
Client decision	Agree with all.
Action taken	ATP added to the curve.

5.10 Lane widths on Karori Road – P C E M

Comment

The citybound kerbside cycle lane is proposed to be 1.4 m with two 3.2 m traffic lanes. This is a lane with that is below minimum as per CNG and TCD Manual and will not likely achieve the project objectives (i.e., people will feel unsafe). The 3.2 m traffic lanes are acknowledged to be for the purposes of the design vehicles.



Probability of crash occurring	N/A
Expected crash severity	N/A

A preferable layout is 3.1 m traffic lanes and 1.6 m cycle lane. Heavy vehicles can encroach when required as there is only paint between the lanes. A narrower traffic lane will also perceptually encourage lower traffic speeds.

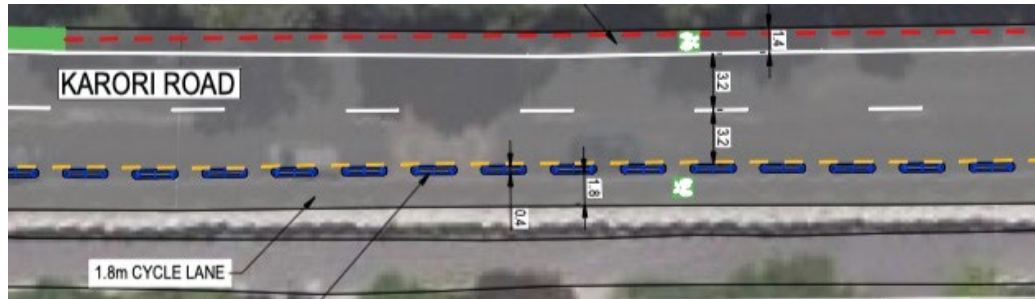


Figure 5-14: clip from Karori Rd part 2 at property number 128

Primary treatment recommendations:

5.10.1 | N/A

Supporting treatment recommendations:

5.10.2 | Consider lane width reallocation to encourage more ridership

Responses:

Designer	Reducing the traffic lane widths results with the 300mm minimum clearance between opposing buses will not be achieved for this section. 3.2m bus lane are required. No change proposed.
Safety Engineer	Agree with Designer's response.
Client decision	Agree with the responses above.
Action taken	No change.

5.11 Missing ASBs at Karori / Parkvale – C

Comment

ASBs are not indicated but would help people on bikes in “taking the lane” for right turns.



Probability of crash occurring | N/A

Expected crash severity | N/A

Primary treatment recommendations:

5.11.1 | N/A

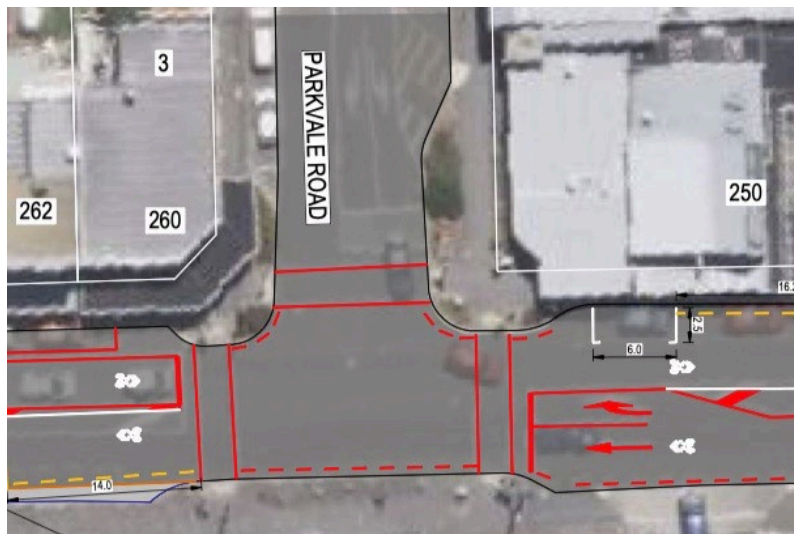


Figure 5-15: lack of ASBs at Parkvale Rd signals

Supporting treatment recommendations:

5.11.2 Consider ASB markings to encourage and legitimise vehicular-style right turns for people on bikes.

Responses:	
Designer	Noted, ASB will be included.
Safety Engineer	Agree with CAT and Designer's response.
Client decision	Agree with CAT and responses.
Action taken	ASBs added to the designs.

5.12 Abrupt transition at Chamberlain Rd – C
Significant

The safety issue is that the intersection cycle lane abruptly ends on the departure side of the side road, followed immediately by a sharrow in the mixed traffic lane. Motorists will see the obvious cycle lane and may not expect a person on a bike to "pop out" in front of them (even with the proposed sharrow).

The crash type/s expected are rear end (motorist overtaking cyclist) and sideswipe.

The risk factors are traffic volumes and speeds.



Probability of crash occurring	Very unlikely
Expected crash severity	Serious injury
Primary treatment recommendations:	

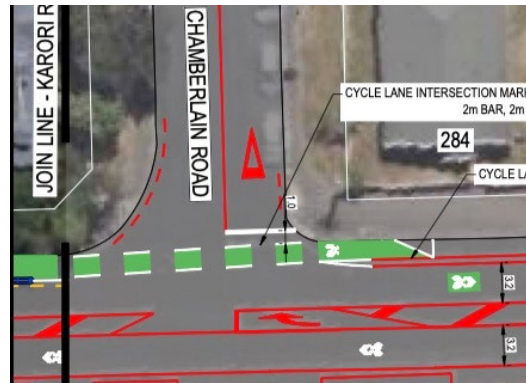


Figure 5-16: abrupt transition for people on bikes

5.12.1	N/A
Supporting treatment recommendations:	
5.12.2	Consider a more gentle taper from the cycle lane to mixed traffic and sharrows.

Responses:	
Designer	Recommendation accepted will be amended to extend taper.
Safety Engineer	Agree with CAT and Designer’s response.
Client decision	Agree with CAT and responses.
Action taken	The taper has been made more gentle in the designs.

5.13 Pedestrian refuge accessibility near Richmond Av – P

Comment

For a 90% design plan, detail is lacking for this proposed median refuge. The safety issues include:

- broken yellow no stopping lines terminate downstream of the crossing point; motorists may park in the way of people trying to use the refuge
- there are no kerb ramps on either side of the road
- the cycleway separators are not spaced to enable pedestrians to cross the road

It is assumed that these errors are due to incomplete plans, so no safety rating has been attached.



Probability of crash occurring	N/A
Expected crash severity	N/A
Primary treatment recommendations:	
5.13.1	Complete the design development to show kerb ramps and a clear path of pedestrian travel.

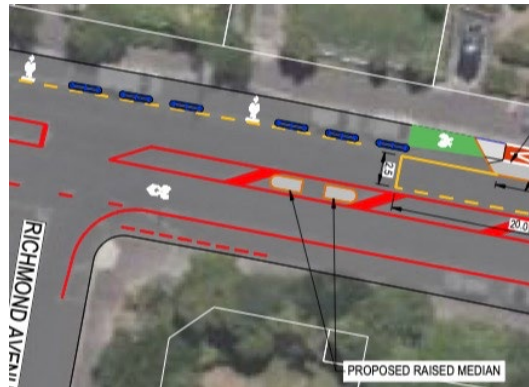


Figure 5-17: pedestrian refuge lacks accessibility details including kerb ramps

Supporting treatment recommendations:

5.13.2 N/A

Responses:	
Designer	Noted, will be amended to add ramps on both sides.
Safety Engineer	Agree with CAT, the amended design should include the ramps, BYLs, and revising spacing of cycleway separators.
Client decision	Agree with CAT and responses.
Action taken	Kerb ramps have been added and a separator removed in the designs.

5.14 Tringham St crossing details – P C E M

Minor

The plans omit required and desirable pedestrian crossing TCDs. The right turn bay is marked in a lane that appears to be less than the 2.5 m minimum width for a turn bay. A turn arrow is not necessary for motorists to know what the flush median is for. These are assumed to be draughting errors or incomplete plans.

Of more significance is the possibility that right turning motorists will overtake in the central median while a pedestrian is crossing and visually blocked by a stopped vehicle who is giving way properly. The crash type expected is motorist striking a pedestrian. However the right turning motorist will be travelling very slow due to horizontal and vertical geometrics.



Probability of crash occurring	Very unlikely
Expected crash severity	Minor injury

Primary treatment recommendations:

5.14.1 N/A

Supporting treatment recommendations:

The risk factors are traffic volumes. The relevant standards are contained in the TCD Manual.

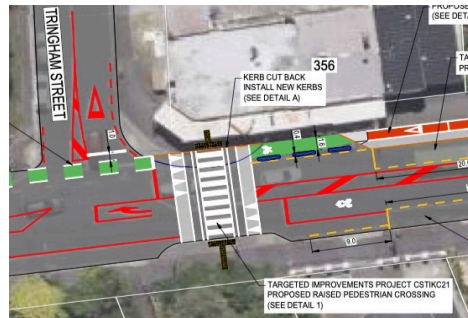


Figure 5-18: xxx

5.14.2 Complete the detailing for the Tringham Street pedestrian crossing.

5.14.3 Omit the right turn arrow if the bay is less than 2.5 m wide.

Responses:

Designer	Required TCDs will be included in the 100% design. The lane markings are existing and are not proposed to be changed. No design change proposed. The pedestrian crossing currently exists with this lane configuration.
Safety Engineer	Agree with Designer's response.
Client decision	Agree with designer and safety engineer.
Action taken	TCDs to be added. Otherwise no change.

5.15 Flush median adjacent to in-lane bus stop – P C E M

Minor

The safety issue is that a motorist may be tempted to overtake a stopped bus using the flush median while:

- Another motorist does the same thing in the opposite direction
- One of the stopped buses pulls out, with the bus driver not expecting an overtake

The crash types expected are sideswipe crashes between buses and overtaking motorists and head-on crashes if there is an oncoming motorist using the flush median at the same time. The risk factors are traffic volumes and low light conditions.



Probability of crash occurring	Unlikely
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Expected crash severity	Minor injury
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Primary treatment recommendations:

5.15.1	Install a raised median which can double as a pedestrian crossing facility
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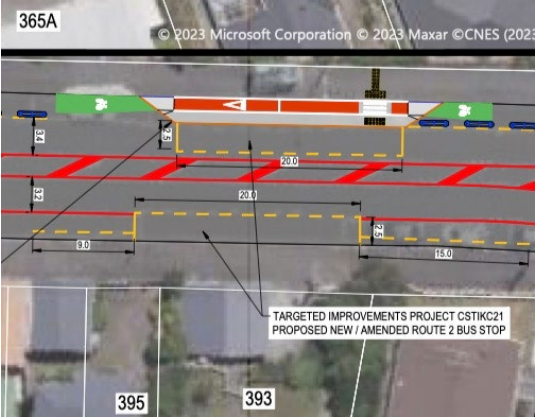


Figure 5-19: flush median adjacent to an inline bus stop

Supporting treatment recommendations:

5.15.2	N/A
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Responses:	
Designer	The inline bus stop removed after consultation and reduces the risk identified.
Safety Engineer	Agree with Designer’s response.
Client decision	Agree with designer and safety engineer.
Action taken	Bus platform removed from design.

5.16 South Karori roundabout markings – C

Significant

The safety issue is that motorists entering the roundabout look for other motorists and fail to see people on bikes. This is an unusual roundabout including a bus only element – motorists are already going to have a high workload. Adding more green backed sharrow markings may help remind motorists of the presence of people on bikes.
 The crash type/s expected right angle crashes due to the “looked but failed to see” issue.
 The risk factors are traffic volumes and speeds.
 The relevant standards are in the CNG.



Probability of crash occurring	Unlikely
Expected crash severity	Serious injury
Primary treatment recommendations:	
5.16.1	N/A
Supporting treatment recommendations:	

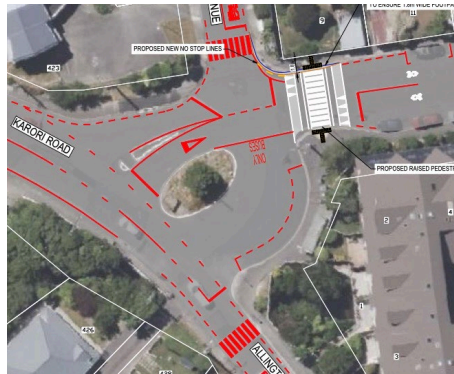


Figure 5-20: Karori / South Karori roundabout proposed markings

5.16.2 Consider green backed sharrows on all approaches and in circulating lanes

Responses:	
Designer	Recommendation accepted as WCC indicated preference for sharrows with green back to be included in roundabout.
Safety Engineer	Agree with CAT and Designer’s response.
Client decision	Agree with all above.
Action taken	Green back sharrows added to design.

5.17 Birdwood St lane widths – **C**

Significant

The CNG identifies 1.5 m as the desirable minimum width for cycle lanes against a kerb in a 50 km/h speed environment. There are sections of 1.2 m cycle lane with a 0.3 m buffer which achieves the desirable minimum width. However, the design includes long sections of 1.2 m wide cycle lanes and in some places this is adjacent to wide parking lanes and relatively wide traffic lanes some are well above the legal minimum width of 2.5 m. It is acknowledged that traffic lanes are reduced to 2.5 -2.6 m in some locations which is a minimum width.



Probability of crash occurring	Very unlikely
Expected crash severity	Serious injury
Primary treatment recommendations:	
5.17.1	N/A

Cycle lanes should be marked at either 1.5 m or 1.2 + 0.3 m buffer and then distribute the remaining road width to traffic lanes. This can be achieved along most of the route apart from some very tight sections where the design is minimums on minimums.

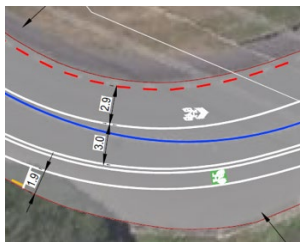


Figure 5-21: wide parking lane



Figure 5-22: wide traffic lanes

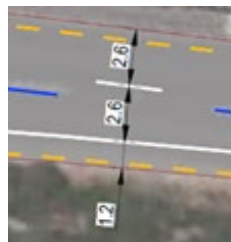


Figure 5-23: narrow traffic lanes

Supporting treatment recommendations:

5.17.2 Consider lane widths as recommended.

Responses:

Designer	The Secondary Route designs have been updated. New lane widths are included in updated design pack.
Safety Engineer	Agree with CAT and Designer's response.
Client decision	Agree with all the above.
Action taken	New lane widths on latest design.



6 Audit statement

We certify that we have used the available plans, and have examined the specified roads and their environment, to identify features of the project we have been asked to look at that could be changed, removed or modified to improve safety.


The safety issues identified and noted in this report are summarised in Table 5-1.

Table 5-1: Summary of Issues

<i>Serious</i>	<i>Significant</i>	<i>Moderate</i>	<i>Minor</i>	<i>Comments</i>	<i>Total</i>
0	7	0	4	8	19
<i>Issue</i>					<i>Ranking</i>
4.1	Sharrow markings inconsistency and transitions unclear			Comment	
4.2	Unnecessary signage			Comment	
5.1	Kerb ramp to nowhere opposite 30 Glenmore Rd			Significant	
5.2	Lane widths at bus stop 4316 The Rigi			Comment	
5.3	Kerb ramp blocked near Upland Road			Significant	
5.4	Unclear transition cycleway to roundabout			Minor	
5.5	Segregated path near Upland Road			Comment	
5.6	Cycleway re entry to carriageway angle too steep			Significant	
5.7	Incorrect line edgeline marking Glenmore at Waiapu Rd			Comment	
5.8	Entry to Appleton Park shared path			Minor	
5.9	Unprotected cycle lane on inside of curve			Significant	
5.10	Lane widths on Karori Road			Comment	
5.11	Missing ASBs at Karori / Parkvale			Comment	
5.12	Abrupt transition at Chamberlain Rd			Significant	
5.13	Pedestrian refuge accessibility near Richmond Av			Comment	
5.14	Tringham St crossing details			Minor	
5.15	Flush median adjacent to in lane bus stop			Minor	
5.16	South Karori roundabout markings			Significant	
5.17	Birdwood St lane widths			Significant	



Designer: Greg Murison Position Design Manager

Signature  Date 02/08/2023

Safety Engineer: Dennis Davis Position Principal Transport Engineer, WCC

Signature  Date 8/08/2023

Client:  Position Maintenance & Renewals Manager

Signature _____ Date 8 September 2023

Project Manager - action completed: Jonathan Kennett Position Project Lead

Signature _____ Date 20/08/2023

Audit report distributed on: _____ Date _____