URBAN CONNECTION
local and connected

Waipawa Streets for People

Detailed Design Stage Safe System Audit Report

Prepared for Central Hawke's Bay District Council

REVISION 0 – MARCH 2024

Table of Contents

1 Safe System Auditing for Transport Projects

This report is for a Detailed Design Stage Safe System Audit for Waipawa Streets for People Project, prepared for Central Hawke's Bay District Council.

A Safe System audit is an independent review of a future transport project to identify any safety concerns that may affect the safety performance and alignment to a Safe System. The audit team considers the safety of all road users and qualitatively reports on road safety issues or opportunities for safety improvement.

A Safe System audit is, therefore, a formal examination of a transport project, or any type of project which affects road users (including cyclists, pedestrians, mobility impaired etc.), carried out by an independent competent team which identifies and documents Safe System alignment and road safety concerns.

A Safe System audit is intended to help deliver a safe road system and is not a review of compliance with standards.

1.1 Safe System Audit Procedure

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 Safe System audit is a safety review used to identify all areas of a project that are inconsistent with a safe system and bring those concerns to the attention of the client in order that the client can make a value judgement as to appropriate action(s) based on the risk guidance provided by the safety audit team.

The key objective of a Safe System audit is summarised as follows:

To deliver completed projects that contribute towards a Safe System by identifying and ranking potential safety concerns for all road users and others affected by a transport project.

A Safe System audit should be undertaken at project milestones such as:

- Concept Stage (part of Business Case);
- Scheme or Preliminary Design Stage (part of Pre-Implementation);
- Detailed Design Stage (Pre-implementation / Implementation); and
- Pre-Opening / Post-Construction Stage (Implementation / Post-Implementation).

A Safe System audit is not intended as a technical or financial audit and does not substitute for a design check on standards or guidelines.

Any recommended treatment of an identified safety concern is intended to be indicative only and to focus the design team on the type of improvements that might be appropriate. It is not intended to be prescriptive and other ways of improving road safety or operational problems identified should also be considered.

In accordance with the procedures set down in the "Waka Kotahi NZ Transport Agency Safe System Audit Guidelines," the audit report should be submitted to the client, who is to instruct the design team to respond. The design team should consider the report and comment to the client on each of any concerns identified, including their cost implications where appropriate, and make a recommendation to either accept or reject the audit report recommendation.

For each audit team's recommendation that is accepted, the client shall make the final decision and brief the design team to make the necessary changes and/or additions. As a result of this instruction, the design team shall action the approved amendments. The client may involve a safety engineer to provide commentary to aid the decision.

Decision tracking is an important part of the Safe System audit process. A decision tracking table is embedded into the report format at the end of each set of recommendations to be completed by the design team, safety engineer and client for each issue, documenting the design team's response, client decision and the action taken.

A copy of the report, including the design team's response to the client and the client's decision on each recommendation, shall be given to the Safe System audit team leader as part of the important feedback loop. The Safe System audit team leader is to disseminate this to team members.

1.2 The Safe System

A Safe System is a forgiving road system that takes into account human fallibility and vulnerability. Under a Safe System, the whole transport system is designed to protect people from exposure to high crash forces that lead to death and serious injury (DSI).

It is recognised that people are vulnerable, and the key crash types and associated crash forces that people can be exposed to lead to death or serious injuries. A Safe System manages crash forces within these limits to protect people.

The audit team is required to understand the human tolerance to force and identify where these boundary conditions are likely to be exceeded when reviewing the transport project.

1.3 Report Format

The potential road safety problems identified have been ranked as follows:

- The expected crash probability is qualitatively assessed on the basis of expected exposure (how many road users will be exposed to a safety issue) and the likelihood of a crash resulting from the presence of the issue.
- The severity of a crash outcome is qualitatively assessed on the basis of factors such as expected impact speeds, type of collision, angle of collision and type of vehicle involved.

The key crash types and respective impact speed thresholds are shown below in Figure 1.3-1.

Key crash type	Impact speed threshold
Car/pedestrian/cyclist 	20-30 km/h
Car/motorcyclist 	20-30 km/h
Car/tree or pole (non-frangible objects) 	30-40 km/h
Car/car (side-impact, intersections) 	50 km/h
Car/car (head-on, rear-end) 	70 km/h

Figure 1.3-1 - Key crash types and impact speed thresholds

Reference to historic crash rates 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, frequency and likely severity that may result from a particular concern.

The frequency and severity ratings are used together to develop a combined qualitative risk ranking for each safety issue using the Safety concern risk rating matrix below. The qualitative assessment requires professional judgement and a wide range of experience in projects of all sizes and locations.

		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

Figure 1.3-2 - Safety Concern Risk Rating Matrix

1.4 Disclaimer

The findings and recommendations in this report are based on an examination of available relevant plans, the specified road and its environs, and the opinions of the SSA team. However, it must be recognised that eliminating safety concerns cannot be guaranteed since no road can be regarded as absolutely safe, and no warranty is implied that all safety issues have been identified in this report. Safe system audits do not constitute a design review nor an assessment of standards with respect to engineering or planning documents.

Readers are urged to seek specific technical advice on matters raised and not rely solely on the report.

While every effort has been made to ensure the report's accuracy, it is made available on the basis that anyone relying on it does so at their own risk without any liability to the safety audit team or their organisations.

2 Safe System Audit Details

2.1 Type of Audit

This is a Detailed Design Stage Safe System Audit (SSA) for the Waipawa Streets for People Project.

The Auditors have been involved in the previous stage preliminary design stage Road Safety Audit, but acknowledge many of the design details have changed.

A key driver of the SSA is the identification of hazards or deficiencies that can potentially result in serious and fatal crashes.

2.2 The Safety Audit Team

The safe system audit was carried out in accordance with the Waka Kotahi NZ Transport Agency Safe System Audit Guidelines, Road to Zero Edition – August 2022 by:

- Tony Harrison, Urban Connection Limited, Hawke's Bay – Team leader
- Jonno Fletcher, Urban Connection Limited, Christchurch – Team member

2.3 Meetings and Site Inspections

The Safety Audit Team (SAT) attended meetings on the final design on 1 March 2024 and 19 March 2024 where changes to the project scope and updated design were discussed.

A team member visited the site on 26th March 2024 and obtained some site photos.

3 Project Description

3.1 Project Background and Objective

The project proposes pedestrian and cycle facilities, including the installation of proposed pedestrian crossings, and installation of a mini roundabout on SH2 in the township of Waipawa. Previously designed raised safety platforms (RSP's) at existing and proposed pedestrian crossings are no longer proposed as part of the design.

The project aims to improve vulnerable road user safety, connectivity, encourage active mode users and level of service through positive speed management and safer intersection with the introduction of a roundabout.

As part of the 'Streets for People' programme the current proposal is for temporary installation utilising bolt on rubber islands, kerbs and other tactical urbanism techniques.

3.2 Existing Conditions and Context

The existing conditions and context of the sections subject of this assessment are as follows:

- SH2 has a recorded annual average daily traffic (AADT) of 10,129 (MobileRoad 2021), with 8% of heavy vehicles;
- SH2 provides a connection between Hawke's Bay and Central Hawke's Bay, and further south, passing through the township of Waipawa;
- Waipawa has various retail and service businesses. The State Highway divides the majority of the population from the retail and service area; and
- The posted speed limit is 50 km/h throughout the site.

3.3 Proposed Works

The project proposes the following improvements.

- Installation of new temporary roundabout, and pedestrian crossing facilities;
- The works include:
    - Installation of a mini bolt on roundabout and associated intersection changes;
    - Construction of pedestrian (zebra) crossings;
    - Installation of planter boxes, rubber kerbs and other forms of lane separation; and
    - Road markings and signs.

The SSA team has been provided with the following documents for this audit:

- Drawing Set 310205048-01-100 Sheets 1 – 7 Rev 0, dated 06.03.24
- Email communication based on the design changes to the latest plans

4 Assessment of Safe System Alignment

4.1 Safe System Assessment Summary

The Safe System Assessment Matrix scores for the existing conditions and the proposed design options are shown in Table 4.1-1. The scores for each crash type are shown in Figure 4.1-1. The detailed assessments are presented in Appendix A.

Table 4.1-1 - Safe System Assessment Score Summary

Option	Score – Existing	Score – Proposed
Streets for People	203 / 512	163 / 512

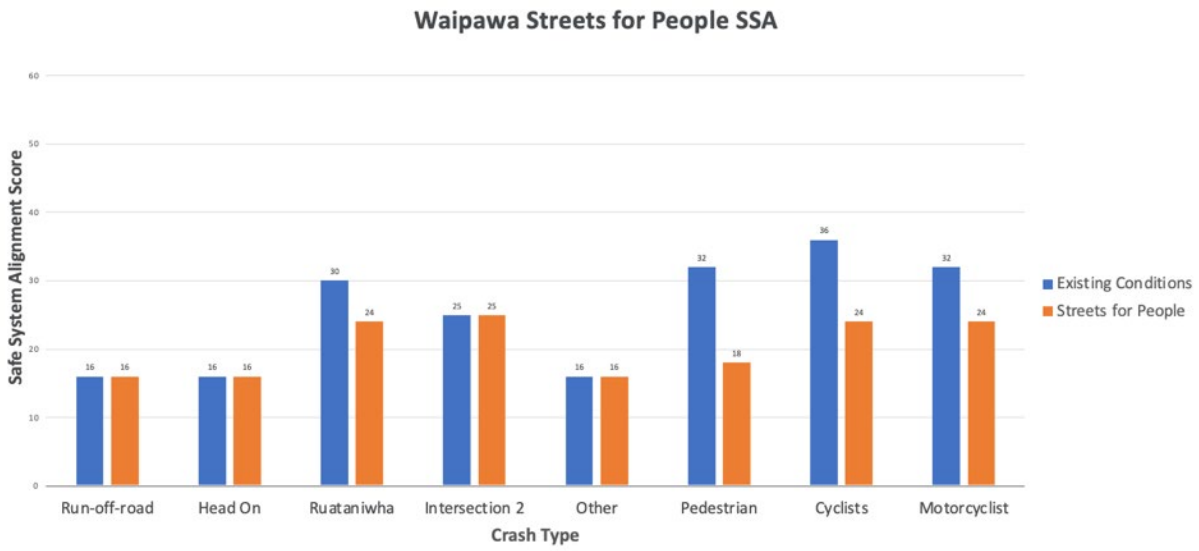


Figure 4.1-1 - Safe System Assessment Score Summary

The Safe System Assessment (SSA) previously showed positive benefits for pedestrian safety, predominately due to reduction in speed with the raised platforms and mini roundabout. There were also positive benefits for cyclist safety due to the separated cycle path, defined on road cycle lane, speed reduction with the raised platforms and roundabout.

5 Safety Concerns

5.1 Crash History

The crash history of the site was assessed to assist the SSA team in understanding the safety performance of the site and its immediate surroundings. A 5-year CAS assessment was undertaken from 2018 through 2022, 2023 to date, extending the length of the project. The crash location maps are shown in Figure 5.1-1, and the summary of the crashes is presented in Table 5.1-1.

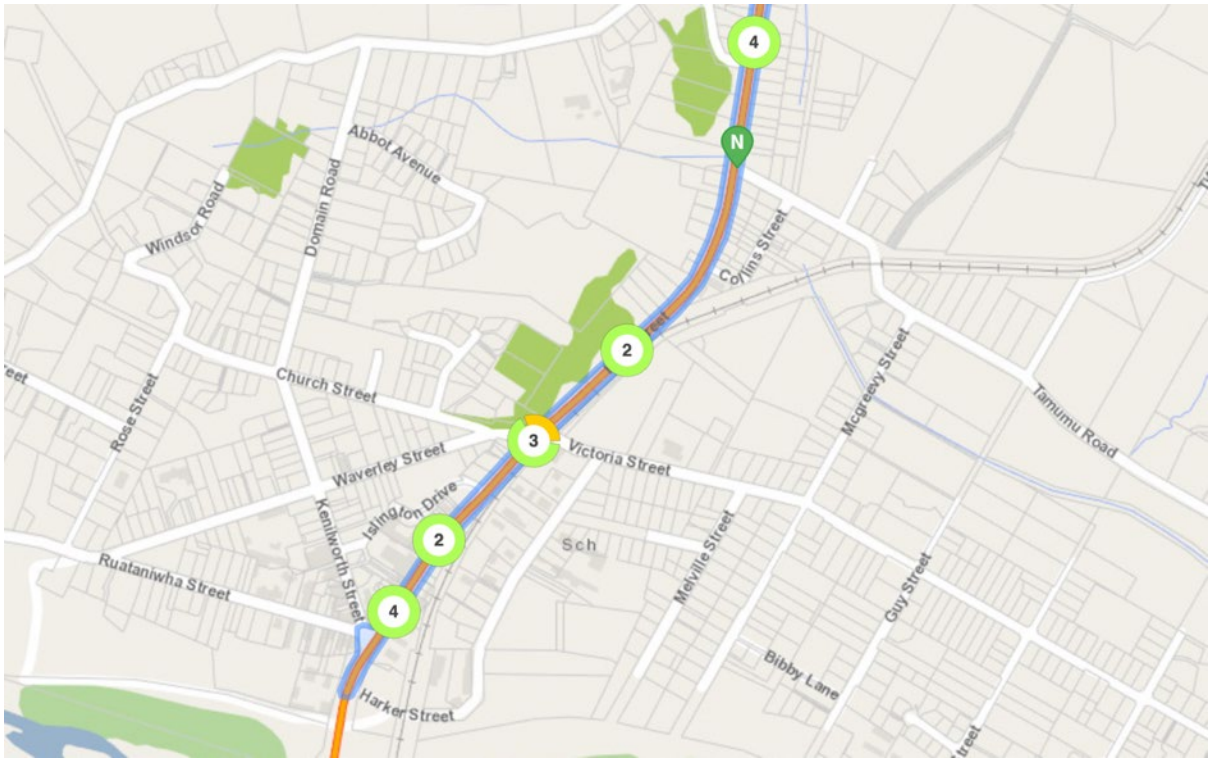


Figure 5.1-1 – Extent of safety assessment and crash locations

Table 5.1-1: Crash Summary 2018 – 2023 (to date)

Crash Severity	High Street Street (SH2)	
	Frequency	Casualties
Fatal	0	0
Serious	0	0
Minor Injury	1	1
Non-injury	15	0
Total	**16**	**1**

Crash Type		Environment		
Overtaking crashes	0%	Natural light conditions	Light/overcast	63%
Straight road lost control/head-on	38%		Dark/twilight	31%
Bend lost control/head-on	6%	Road conditions	Dry	88%
Rear end/obstruction	50%		Wet	6%
Crossing/turning	6%		Ice or Snow	0%
Others	0%	**Intersection/midblock**		
Involved motorcyclists	0%	Intersection		25%
Involved pedestrians/cyclists	0%	Midblock		75%

There have been sixteen crashes on High Street (SH2) within the project length. There have been no recorded pedestrian or cyclists crashes. Three of the crashes involve vehicles rear-ending other vehicles stopped or slowing for pedestrians using the pedestrian crossing.

5.2 Changes / Update from the Preliminary Design Stage

The safety concerns from the Preliminary Design Stage RSA are presented in Table 5.2-1 below. This summarises the previously identified risks, the client's decision or actions taken in this stage (in particular, this documents the change in scope from the previous stage).

Table 5.2-1: Concerns from the Preliminary Design Stage

Safety Concern	Action for Detailed Design Stage
Item 3.1.1 – Connectivity to the Waipukurau to Waipawa Shared Path	Issue resolved – Considered outside the scope for the SfP project. To be considered by NZTA / CHBDC as a separate, future project.
Item 3.1.2 – Northern extent of on road cycle lane	Issue resolved – Agreed with client / change in scope. Cycle lanes removed from scope.
Item 3.1.3 – Speed Limit	Issue somewhat resolved – Speed limit not part of project, however, before and after surveys are recommended to measure the safety inputs.
Item 3.1.4 – Planter Boxes	Issue somewhat resolved – previous designed planter boxes now not within the scope of the project. However, if planter boxes are to be used, then the project team must consider frangible devices as to not become a roadside hazard.
Item 3.1.5 – Side Road limit lines	Issue resolved – Agreed with client / change in scope. Cycle lanes removed from scope.

Item 3.1.6 – Victoria Street stacking distance – KiwiRail	Issue resolved – Agreed with client / change in scope. Cycle lanes removed from scope.
Item 3.1.7 – Parking near Collins Street	Issue resolved – Agreed with client / change in scope. Cycle lanes removed from scope.
Item 3.1.8 – Threshold Design	Issue resolved – Agreed with client, removed from scope.
Item 3.1.9 – Waverley Street angle of exit	Issue resolved – delineation and linemarking added to latest design
Item 3.1.10 – High volume accessway treatment	Issue resolved – Agreed with client / change in scope. Cycle lanes removed from scope.
Item 3.1.11 – Harker Street intersection Connectivity	**Item not resolved –** Previous stage audit decision stated a splitter island to be provided on Harker Street
Item 3.1.12 – Location of southern RSP	Issue somewhat resolved – RSP removed from scope, but informal crossing provided further north
Item 3.1.13 – Roundabout Signage	Issue resolved – additional signage provided on splitter islands
Item 3.1.14 – Roundabout Splitter Islands	Issue resolved – splitter islands provided in latest design
Item 3.1.15 – Kenliworth Street pedestrian crossing	**Item not resolved –** No crossing provided in the latest plans and Ruataniwha Street crossing also removed
Item 3.1.16 – Street Lighting	Item somewhat resolved – Lighting design added to scope.
Item 3.1.17 – Roundabout Markings	Item somewhat resolved – Kerb and markings adjusted, however, cycle pinch point still exists
Item 3.1.18 – Roundabout Diameter	Item somewhat resolved – Roundabout adjusted in updated design, however, still to be confirmed and tracking paths not provided for comment.

5.3 Summary of findings

The frequency of risk rankings associated with this Safe System Audit is provided below, with the detailed findings to follow. This summary illustrates the degree of consideration that should be given when working through the findings.

Table 5.3-1: Summary of Findings

Serious	Significant	Moderate	Minor	Comment	Total
2	1	3	0	7	13

5.4 General Safety Concerns

5.4.1 Southern Threshold Markings Comment

An updated threshold treatment has been proposed at the south end of the project extent. This includes additional / updated threshold (speed) signage and coloured surface pavement markings to reinforce the speed limit and attempt to control speeds of entry to the proposed roundabout. The updated design is shown in Figure 5.4-1.

The plans provided do not have further information or details around the type of surfacing / paint to be used. The SAT are concerned if the incorrect product is applied, it can be a hazard to some road users, including cyclists, and in particular, motorcyclists. There are also maintenance considerations which in turn lead to safety in design decisions around the type of product, maintenance intervention, traffic control etc. The same comment applies to the proposed treatment at the northern threshold.

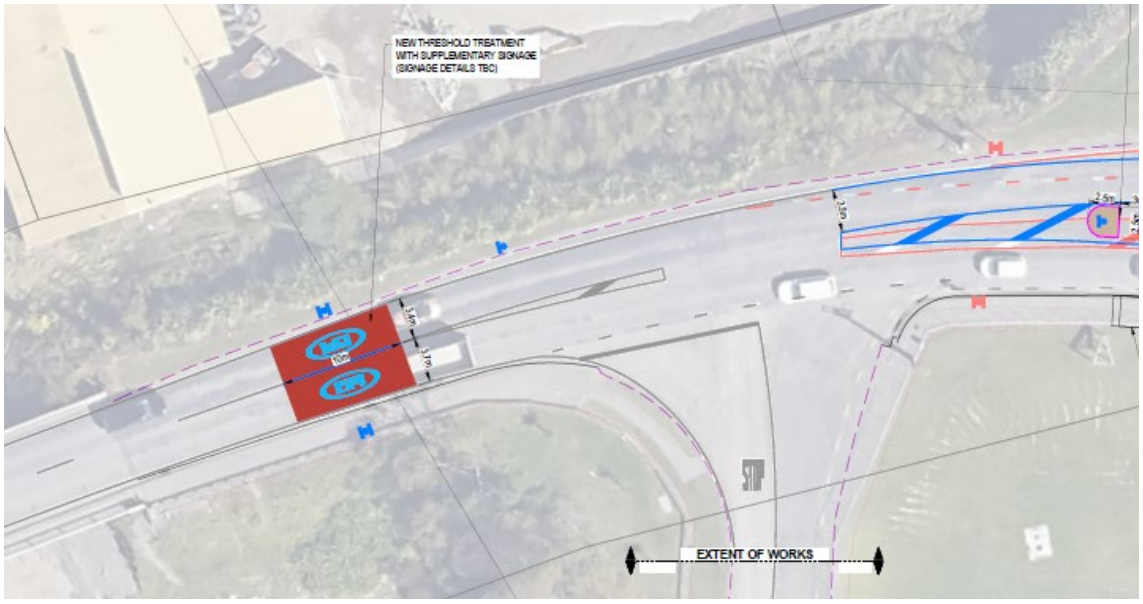


Figure 5.4-1 – Proposed southern threshold treatment

Recommendation:

1. *Confirm pavement surface markings to be used at the thresholds, and confirm they consider the safety of motorcyclists*

Probability Rating:	***Severity Outcome Rating:***
The probability of a crash is **N/A**	***Crashes are likely to be*** **N/A**
Design Team Response: Click here to enter text.	
Safety Engineer: Click here to enter text.	
Client Decision: Click here to enter text.	
Action Taken: Click here to enter text.	

5.4.2 Rumble Strips Comment

Rumble strips are proposed for the southern entrance into Waipawa in an effort to control entry speeds approaching the proposed roundabout and crossing facilities. At the time of the audit, details of the rumble strips were still being confirmed by the design team.

The SAT recommend the rumble strip material and design should consider motorcyclist safety as to ensure stability and traction of motorcyclists are maintained.

Recommendation:

1. *Confirm the rumble strip design considers motorcycle safety*
2. *Consider monitoring of the other design changes and speeds, prior to consideration and installation of any rumble strips*

Probability Rating: ***The probability of a crash is*** **N/A**	***Severity Outcome Rating:*** ***Crashes are likely to be*** **N/A**
Design Team Response: Click here to enter text.	
Safety Engineer: Click here to enter text.	
Client Decision: Click here to enter text.	
Action Taken: Click here to enter text.	

5.4.3 South Pedestrian Facility Significant

The plans provided show a new pedestrian refuge proposed between Harker Street and Ruataniwha Street, as shown in Figure 5.4-2. Following meetings and correspondence with CHBDC, it has been decided this will be replaced by a mountable island only. The reasoning for this is to help with deflection and approach speed to the roundabout proposed at Ruataniwha Street. For pedestrians, this will mean the crossing point in this location will not be promoted, but the island can be used for those that decide to cross in this location.

The SAT have the following concerns:

- It is unclear as to the pedestrian volumes and desire lines in this location (i.e. there was previously a need for the crossing here with this shown in earlier schemes)
- If pedestrians are not actively encouraged or forced to the BP crossing point, they will continue to cross in this location.
- Overall connectivity of the pedestrian crossing within the area is poor (see Audit Point 5.4.4)

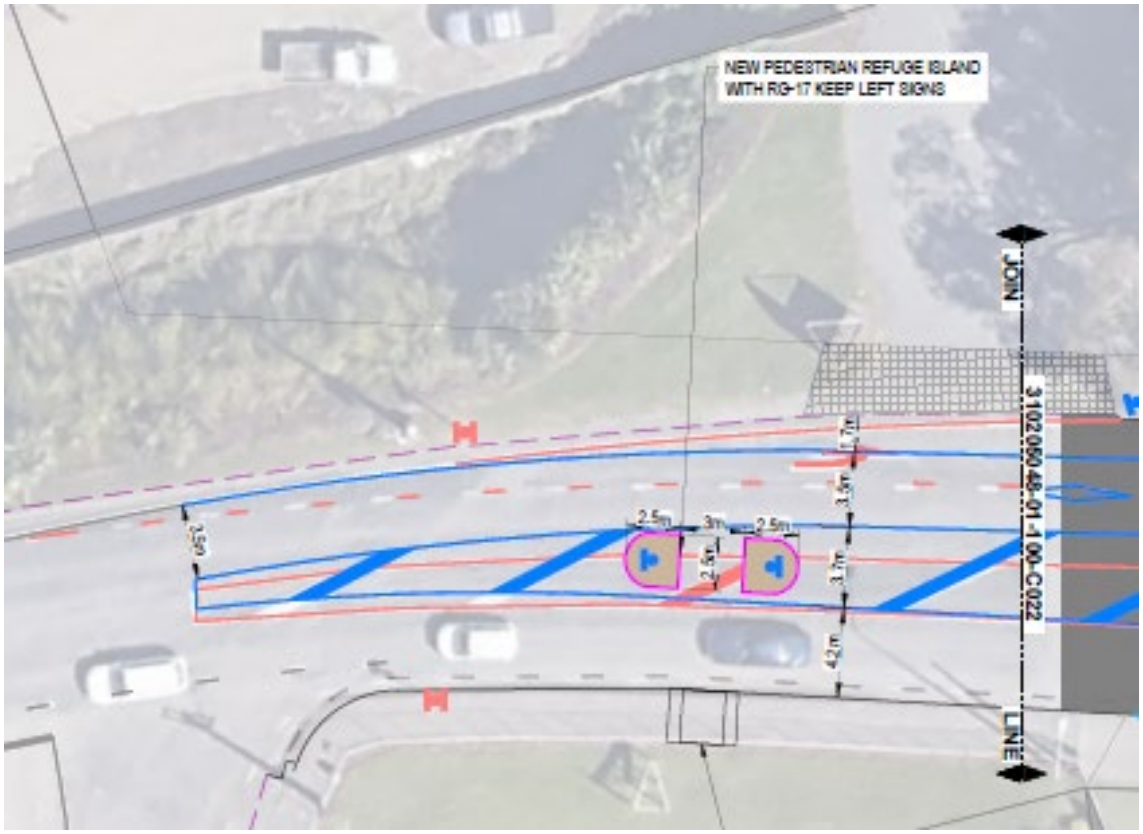


Figure 5.4-2 – Proposed southern pedestrian refuge

Recommendation:

1. *Confirm pedestrian desire lines and volumes for this location*

2. *Consider improvements to this crossing location (even if temporary i.e. by use of removable kerbs etc) if desire lines are strong*

3. *Consider further measures to encourage crossing at the BP facility*

Probability Rating: ***The probability of a crash is*** **Unlikely**	***Severity Outcome Rating:*** ***Crashes are likely to be*** **Serious**
Design Team Response: Click here to enter text.	
Safety Engineer: Click here to enter text.	
Client Decision: Click here to enter text.	
Action Taken: Click here to enter text.	

5.4.4 Overall pedestrian connectivity Comment

The previous design stages included formal (zebra) pedestrian crossing facilities (all raised platforms) in three locations: north of Harker Street; Outside BP; across Ruataniwha Street. Furthermore, there is an existing zebra crossing across Kenliworth Street.

The latest scheme includes only one formal pedestrian crossing facility outside the BP and no longer a raised safety platform. It is unclear why the crossing point has been removed from Ruataniwha Street. Although the project proposes to improve pedestrian connectivity and there will be an improved facility across SH2, the SAT are concerned that overall pedestrian connectivity and safety will not be improved across the wider scheme.

In addition, two crossing locations were agreed at the last audit stage to be undertaken at the next stage (this stage). Refer below to previous audit point 3.1.11 and 3.1.15.

3.1.11 Harker Street Intersection - Connectivity

Comment

The project finishes immediately prior to the Harker Street intersection. To the south of this is the Waipawa River Bridge which as discussed in Section 5.3.1 leads to the Waipawa to Waipukurau shared path. The SAT believe changes to the Harker Street intersection should be included as part of the Streets for People project.

The natural desire line is across the throat of the intersection. Users are likely to cross here whether there are facilities or not. The installation of a splitter island with a refuge would provide benefits for users to provide protection and a two part crossing. It is understood that there are potential changes to the use of Harker Street which may allow this crossing point to be designed differently. It is recommended that this be taken into consideration as part of this project to improve connectivity.

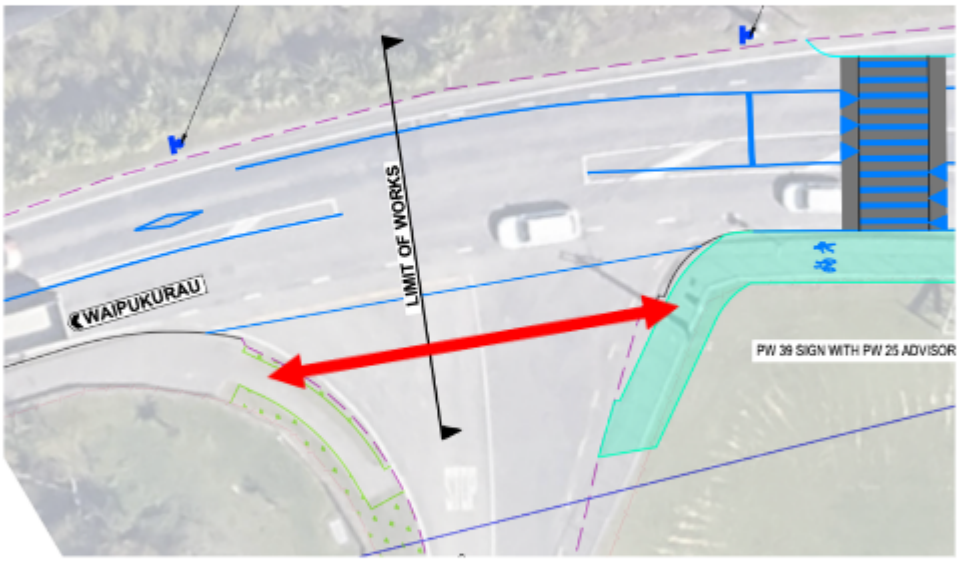


Figure 5.38 – Harker Street, Desire line

Recommendation:

1. *Include this intersection within the project scope and introduce facilities to improve the safety and level of service for pedestrians and cyclists.*

Probability Rating:	***Severity Outcome Rating:***
The probability of a crash is **N/A**	***Crashes are likely to be*** **N/A**

Design Team Response: *This was discussed with CHBDC and WK project representatives on 26/4/2023. It was advised to consider a splitter island on Harker Street. Design will be updated to include a splitter island.*

3.1.15 Kenilworth Street pedestrian facilities — Serious

The design does not include any pedestrian facilities across Kenilworth Street. The SAT is aware of there being reasonable pedestrian demand across this intersection. The angle of entry of Kenilworth Street makes this a wide intersection for pedestrians to cross. There is a risk in particular to older, disabled and young vulnerable users trying to cross this wider section of road. Due the nature of the users any injuries will be serious.

Consideration should be given to providing improved pedestrian facilities across this intersection.

There is a non-standard line, circled in Figure 5.3.12, which is assumed to be a draughting error.

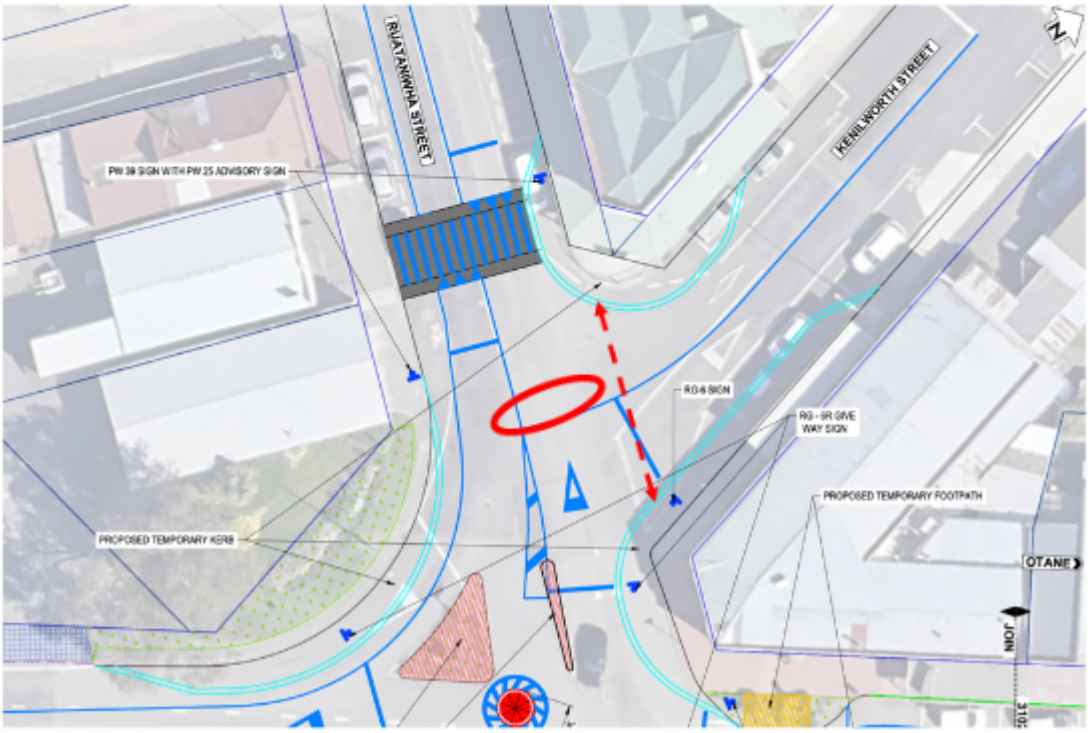


Figure 5.312 – Pedestrian demand across Kenilworth Street

Recommendation:

1. *Confirm pedestrian demand and desire lines for the project extents*
2. *Confirm crossing facility for Harker Street (previous audit agreed this would include a splitter island)*
3. *Confirm crossing facility for Kenliworth Street (previous audit agreed this would be provided further north of the existing crossing)*
4. *Confirm proposed crossing facility across Ruataniwha Street*

Probability Rating: ***The probability of a crash is*** **N/A**	***Severity Outcome Rating:*** ***Crashes are likely to be*** **N/A**
Design Team Response: Click here to enter text.	
Safety Engineer:	Click here to enter text.
Client Decision:	Click here to enter text.
Action Taken:	Click here to enter text.

5.4.5 Planter boxes Moderate

No landscape plans were made available to the SAT to review as part of this audit. The design team note the proposed use of planter boxes within the scheme to help with narrowing and / or delineation.

Previously planter boxes were going to be used on the separator for the bi-directional cycle lane, which is no longer part of the project. Similar concerns apply, which include:

- Potential for pedal snagging for cyclists if not positioned correctly
- Planter boxes can also have sharp corners which can result in serious injuries if struck
- The SAT appreciate there may be an aesthetic value to the planter boxes but they will also potentially create a safety in design issue from a maintenance aspect
- It is unlikely the planter boxes will be frangible, and therefore, pose a roadside hazard to road users

Recommendation:

1. *Confirm the use and location of any potential planter boxes*
2. *Consider other forms of physical separation*

Probability Rating: ***The probability of a crash is*** **Likely**	***Severity Outcome Rating:*** ***Crashes are likely to be*** **Minor**
Design Team Response: Click here to enter text.	
Safety Engineer: Click here to enter text.	
Client Decision: Click here to enter text.	
Action Taken: Click here to enter text.	

5.4.6 Roundabout Tracking Moderate

A new roundabout is proposed at the intersection of SH2 and Ruataniwha Street. There have been some modifications to the previous preliminary design stage. Refer to Figure 5.4-3.

Tracking has not been provided at earlier stages or with the latest design update. The SAT are concerned the roundabout has not been considered for tracking of design vehicles and for all turning movements. For example, there are shoulder pavement markings and speed humps provided on the west side of the intersection (outside BP) to provide some deflection and road narrowing in the southbound direction. However, there are no such markings for the left turn into and left turn out of Ruataniwha Street (shown marked in red in Figure 5.4-3). In particular, the width of existing pavement for the left turn in movement appears to be much wider than other legs of the roundabout (refer to yellow arrows in Figure 5.4-3).

Furthermore, it is unclear whether the central island will be trafficable. There are no details provided around typical details for the roundabout including material (kerb and channel etc); markings and signage. The SAT consider a larger roundabout may be more appropriate in this location to balance out the deflection and speeds of most vehicles, versus the larger tracking required for a heavy vehicle. Higher speeds through the roundabout will increase the severity of any crashes.

One recommendation is to mark a larger roundabout with pavement markings and / or provide a trafficable surface for larger vehicles, where required. Given the nature of the project being experimental in some elements, a temporary roundabout may be considered for monitoring and then adjusted and made more permanent following review of the tracking and overall performance.

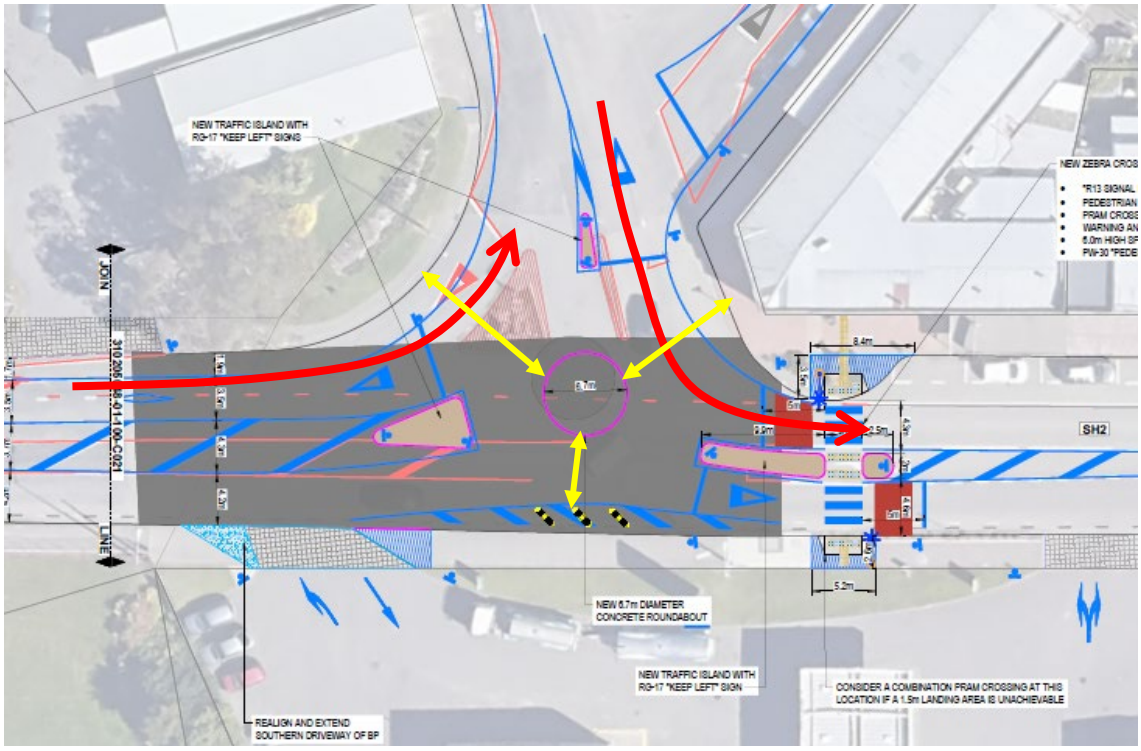


Figure 5.4-3 – Proposed new SH2 Roundabout

Recommendation:

1. *Provide tracking paths for the roundabout and modify markings to suit*
2. *Confirm details of the central island*
3. *Consider additional pavement markings (i.e. shoulder bars) and / or speed bumps (armadillos) on the left turn in and out movements at Ruataniwha Street*

Probability Rating: ***The probability of a crash is*** **Likely**	***Severity Outcome Rating:*** ***Crashes are likely to be*** **Minor**
Design Team Response: Click here to enter text.	
Safety Engineer:	Click here to enter text.
Client Decision:	Click here to enter text.
Action Taken:	Click here to enter text.

5.4.7 Roundabout markings Serious

The design includes an edge line adjacent to the south-west corner of the roundabout. This was raised in the previous design stage audit. This edgeline alters in width through the curve that may make cyclists have a false sense of security as there appears ample shoulder space (approx 2.0m), before narrowing to less than 1.0m (approximated from the plans). There is a high risk of cyclists being struck in this pinch point by heavy vehicles negotiating the roundabout. This is likely to result in death or serious injuries.

Consideration should be given to smoothing this line and / or provided a marked area separating the traffic land (and area used for tracking) and the shoulder area where a cyclist will ride.

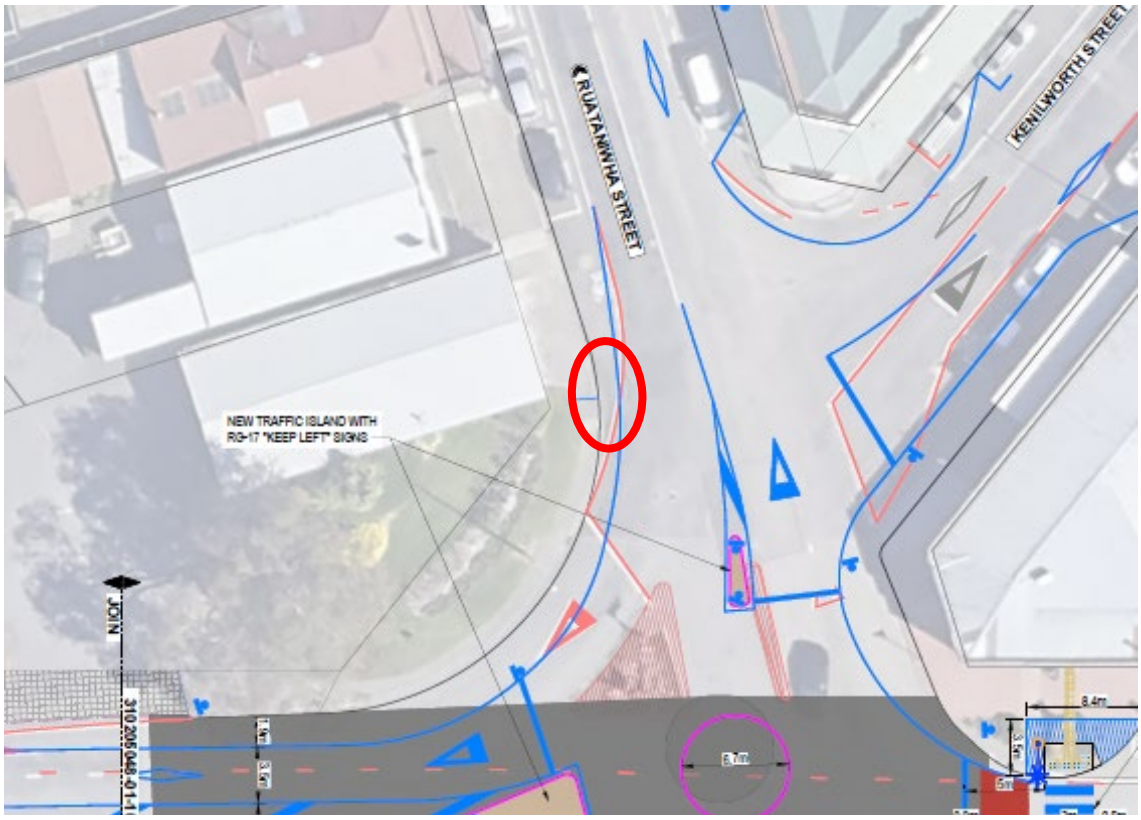


Figure 5.4-4 – Line marking adjacent to the proposed roundabout

Recommendation:

1. *Provide a consistent marked shoulder width for cyclists*
2. *Consider a marked area separating the traffic lane and shoulder to provide additional space for cyclists*

Probability Rating: ***The probability of a crash is*** **Likely**	***Severity Outcome Rating:*** ***Crashes are likely to be*** **Serious**
Design Team Response: Click here to enter text.	
Safety Engineer:	Click here to enter text.
Client Decision:	Click here to enter text.
Action Taken:	Click here to enter text.

5.4.8 Roundabout Details Comment

There are several details missing from the design plans for the roundabout, expected at this stage of design. This includes:

- Tracking (previously noted)
- Lighting details
- Central island details – material, markings, signage

Recommendation:

1. *Provide details for the roundabout design*

Probability Rating: ***The probability of a crash is*** **N/A**	***Severity Outcome Rating:*** ***Crashes are likely to be*** **N/A**
Design Team Response: Click here to enter text.	
Safety Engineer: Click here to enter text.	
Client Decision: Click here to enter text.	
Action Taken: Click here to enter text.	

5.4.9 BP Crossing Serious

A new formal pedestrian crossing (zebra) is proposed across SH2, outside BP as shown in Figure 5.4-5. This was previously a raised safety platform but is now proposed to be at grade. The SAT also understand the traffic islands shown will be removed to reduce confusion and compliance with pedestrians potentially crossing in two movements.

The SAT raise the following concerns / comments:

- A raised safety platform helps to reduce speeds to within safe system tolerances i.e. less than 30 km/h for pedestrians and cyclists
- The traffic islands also help control speeds on approach to the crossing (and roundabout) by physically narrowing the road
- The traffic islands also help with the alignment / entry deflection for approaching vehicles to the intersection
- There is some concern that a southbound vehicle may enter into the flush median (with the islands removed) and attempt to turn right from this position. They may not notice the zebra crossing and / or approach the crossing at high speed, placing users on the crossing at higher risk

The SAT note that RSP's have been removed from scope due to other, outside reasons. However, they are a preferred treatment and safe system intervention as they reduce speeds and thus impact forces should a crash occur. If RSP's cannot be implemented at the current time on this project, then it is highly recommended that all other measures are to the highest standard for visibility of the crossing, i.e. high quality markings and signage and other measures are considered to control approach speeds e.g. vertical elements to provide visibility and assist with traffic calming.

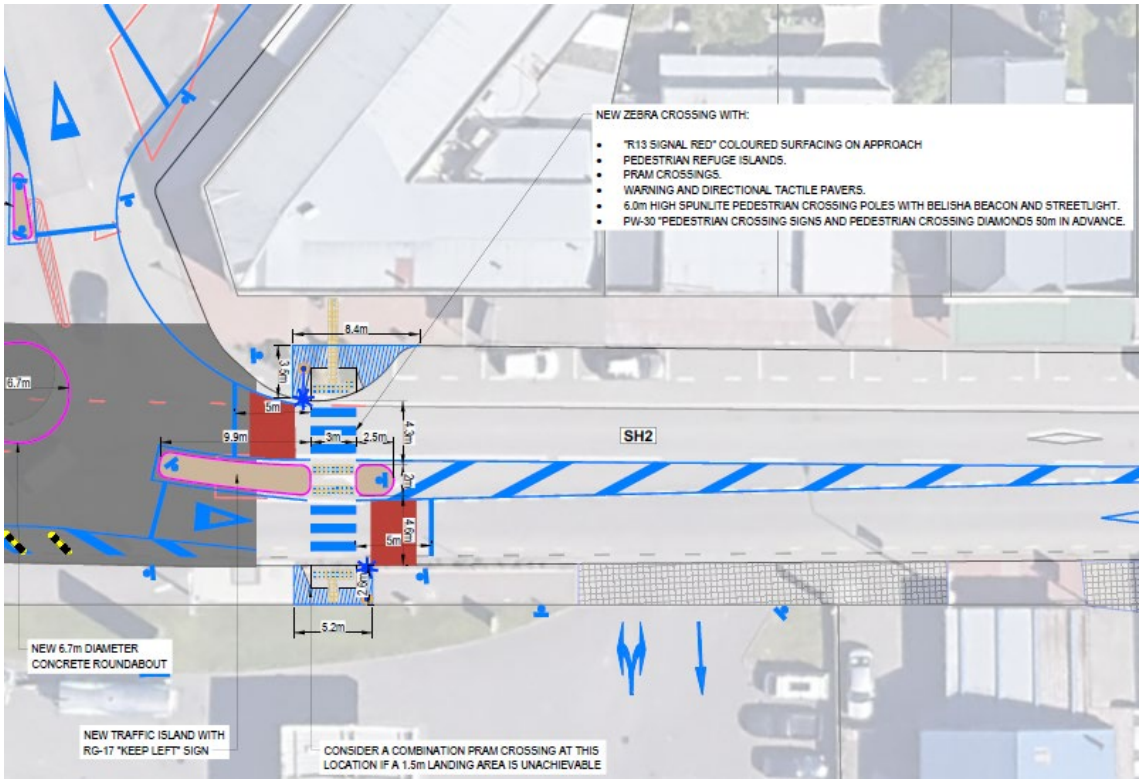


Figure 5.4-5 – Proposed new pedestrian crossing

Recommendation:

1. *Provide a safe system solution i.e. raised safety platform at the crossing*
2. *Confirm if the islands are to be removed. If so, then provide supplementary treatments to help control speeds and increase the prominence of the crossing e.g. physical / vertical separators*
3. *Provide red markings across SH2 to increase prominence*
4. *Provide all other pavement markings and signage that meet current standard*
5. *Confirm lighting for the crossing*

Probability Rating: ***The probability of a crash is*** **Likely**	***Severity Outcome Rating:*** ***Crashes are likely to be*** **Serious**
Design Team Response: Click here to enter text.	
Safety Engineer:	Click here to enter text.
Client Decision:	Click here to enter text.
Action Taken:	Click here to enter text.

5.4.10 Butchery Crossing Pinch Point Moderate

A new formal pedestrian crossing (zebra) is proposed across SH2, outside the butchery as shown in Figure 5.4-6. This was previously a raised safety platform but is now proposed to be at grade.

The SAT raise the following concerns / comments:

- A raised safety platform helps to reduce speeds to within safe system tolerances i.e. less than 30 km/h for pedestrians and cyclists

- There is some concern with the design of the kerb build outs on either side of SH2. It is unclear from the design plans, but the kerb and channel appears to extend into the road shoulder where cyclists will be riding. This creates a pinch point for cyclists and they may be struck by an adjacent vehicle in the traffic lane

The SAT note that RSP's have been removed from scope due to other, outside reasons. However, they are a preferred treatment and safe system intervention as they reduce speeds and thus impact forces should a crash occur. If RSP's cannot be implemented at the current time on this project, then it is highly recommended that all other measures are to the highest standard for visibility of the crossing, i.e. high quality markings and signage and other measures are considered to control approach speeds e.g. vertical elements to provide visibility and assist with traffic calming.

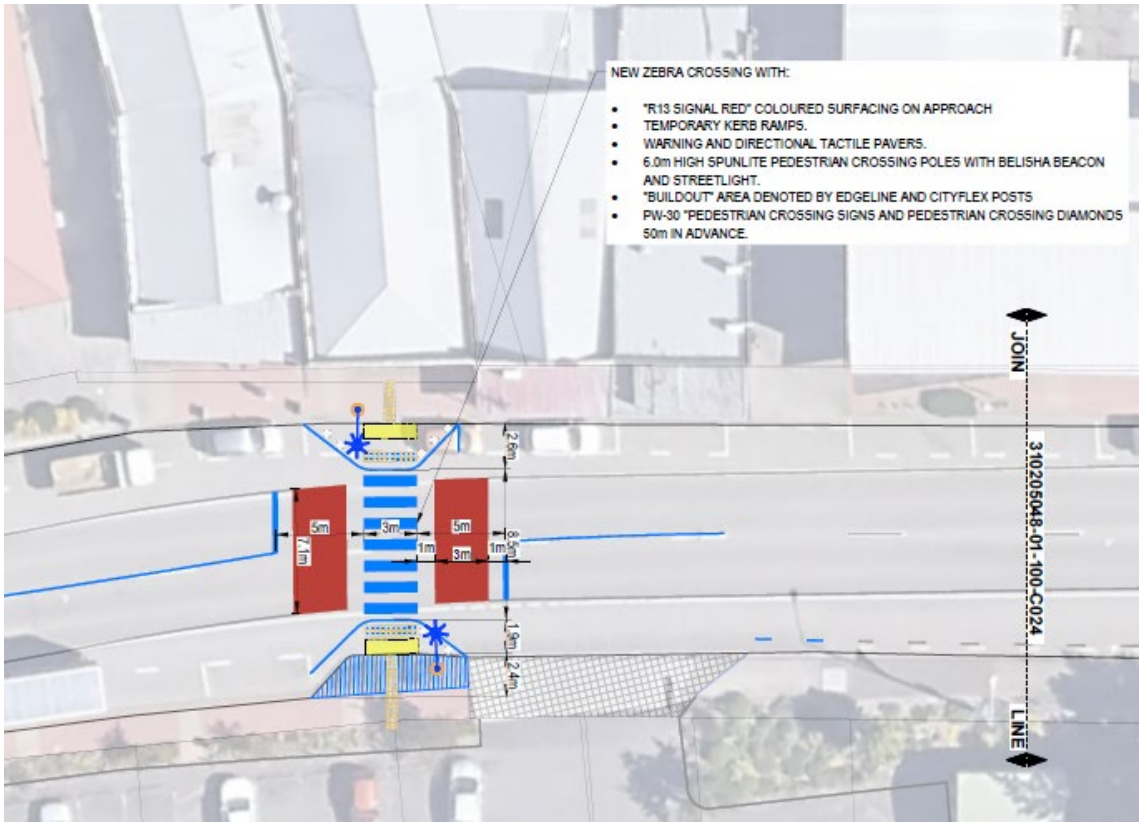


Figure 5.4-6 – Proposed new pedestrian crossing outside Butchery

Recommendation:

1. *Provide a safe system solution i.e. raised safety platform at the crossing*
2. *Confirm the design for the kerb build outs. Provide additional space for on-road cyclists*
3. *Confirm lighting for the crossing*

Probability Rating: ***The probability of a crash is*** **Unlikely**	***Severity Outcome Rating:*** ***Crashes are likely to be*** **Serious**
Design Team Response: Click here to enter text.	
Safety Engineer:	Click here to enter text.
Client Decision:	Click here to enter text.
Action Taken:	Click here to enter text.

5.4.11 Lighting Design Comment

Changes to the intersection layout (new roundabout) and proposed new pedestrian facilities may require changes to the overhead street lighting. As a minimum, existing street lighting should be checked to ensure it meets the appropriate standards and design changes are incorporated prior to construction.

Recommendation:

1. *Ensure street lighting is reviewed and upgrade if required*

Probability Rating: ***The probability of a crash is*** **N/A**	***Severity Outcome Rating:*** ***Crashes are likely to be*** **N/A**
Design Team Response: Click here to enter text.	
Safety Engineer: Click here to enter text.	
Client Decision: Click here to enter text.	
Action Taken: Click here to enter text.	

5.4.12 Pavement Markings Comment

There are a number of existing pavement markings to be removed as part of the project. There are no details on what method will be used to remove the markings. If this is not undertaken satisfactorily, there can be issues with redundant markings remaining. This can cause issues with confusion and pavement issues.

Recommendation:

1. *Confirm method for removing markings and ensure all markings are permanently removed*

Probability Rating: ***The probability of a crash is*** **N/A**	***Severity Outcome Rating:*** ***Crashes are likely to be*** **N/A**
Design Team Response: Click here to enter text.	
Safety Engineer: Click here to enter text.	
Client Decision: Click here to enter text.	
Action Taken: Click here to enter text.	

5.4.13 Missing Details Comment

There are a number of missing details that would be expected at this stage of design, and therefore could not be audited. This includes:

- Signage details – location and type of sign
- Tracking path details (as noted earlier)
- Pavement details
- Detailed cross-sections
- Typical details

Recommendation:

1. *Provide final details as part of final design for safety audit and client decision*

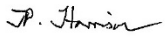
Probability Rating: ***The probability of a crash is*** **N/A**	***Severity Outcome Rating:*** ***Crashes are likely to be*** **N/A**
Design Team Response: Click here to enter text.	
Safety Engineer: Click here to enter text.	
Client Decision: Click here to enter text.	
Action Taken: Click here to enter text.	

6 Safe System 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 in order to improve safety. The problems identified have been noted in this report.

Signed:  Date: 28 March 2024

Jonno Fletcher BE Civil (Hons), MEngNZ
Principal Safety Engineer, Urban Connection Limited

Signed:  Date: 28 March 2024

Tony Harrison, Dip Hway Eng
Technical Director, Urban Connection Limited

Designer:	*Name:*	*Position:* .....
	Signature……	*Date*……..
Safety Engineer:	*Name:*	*Position:* .....
	Signature……..	*Date*……..
Project Manager:	*Name:*	*Position:* .....
	Signature……	*Date*……..
Action Completed:	*Name:*	*Position:* .....
	Signature……..	*Date*……..

Project Manager to distribute audit report incorporating decision to the designer, Safety Audit Team Leader, Safety Engineer, and project file.

Date: ……

Appendix A – Safe System Assessment Matrix

Table 5.3-1 – Safe System Assessment Matrix – *Existing*

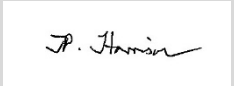
Safe System Assessment - SSA Matrix : Existing conditions								
	Run-off-road	**Head-on**	**Intersection-1 (SH1/Ruataniwha St)**	**Intersection-Other**	**Other**	**Pedestrian**	**Cyclist**	**Motorcyclists**
Exposure comments:	AADT from MobileRoad 2021 estimate: - SH1: 10,129 vpd; 8% HCV AADT > 10,000 vpd.	AADT from MobileRoad 2021 estimate: - SH1: 10,129 vpd; 8% HCV AADT > 10,000 vpd.	AADT from MobileRoad 2021 estimate: - SH1: 10,129 vpd; 8% HCV Combined AADT > 10,000 vpd.	AADT from MobileRoad 2021 estimate: - SH1: 10,129 vpd; 8% HCV Combined AADT > 10,000 vpd.	AADT from MobileRoad 2021 estimate: - SH1: 10,129 vpd; 8% HCV AADT > 10,000 vpd.	No data available, however, urban environment with main street shopping etc. Assume >100 units per day	No data available, however, urban environment with main street shopping etc. Assume 50-100 units per day	Assumed 1% of AADT as data is not available. Motorcyclists volumes of more than 100 units per day, given that AADT >10,000 vpd.
Exposure score:	4 / 4	4 / 4	4 / 4	4 / 4	4 / 4	4 / 4	3 / 4	4 / 4
Likelihood comments:	Factors that increase the likelihood include: - Curved road alignment; Factors that decrease the likelihood include: - Pavement appears to be mostly in good condition; - Moderate shoulders with kerbside parking; - Generally flat alignment; - Good delineation; - 50 km/h posted speed limit	Factors that increase the likelihood include: - No median separation (only standard centreline); - Curve road alignment; Factors that decrease the likelihood include: - Pavement appears to be mostly in good condition; - Generally flat alignment; - Good delineation; - 50 km/h posted speed limit	Factors that increase the likelihood include: - Moderate/high traffic volumes on through road; - Priority control T-intersection: - Left-turn slip lane (masking issues); - High percentage of HCVs; - Intersection in close proximity; Factors that decrease the likelihood include: - 50km/h speed environment - Right-turn bay; - Lighting;	Factors that increase the likelihood include: - Priority control T-intersection type; - Waverley Street: low angle high speed left turn; - Victoria Street: Railway immediately to the east; Short stacking distance; - Kerbside parking in close proximity, restricting sightlines; Factors that decrease the likelihood include: - 50km/h speed environment - Flag Lighting;	Factors that increase the likelihood include: - Kerbside parking (side-swipe or rear-end); - Impact with vehicles entering / exiting numerous driveways; Factors that decrease the likelihood include: - Pavement appears to be mostly in good condition; - Moderate shoulders with kerbside parking; - Generally flat alignment; - Good delineation; - 50 km/h posted speed limit	Factors that increase the likelihood include: - High number of accessways and intersections; - Visibility restrictions at driveways; - High traffic volumes; - High operating speeds for vulnerable users (>30 km/h); Factors that decrease the likelihood include: - Footpaths on both sides of SH1; - Formal pedestrian (zebra) crossings - not raised; - Lighting; - Generally straight and flat alignment;	Factors that increase the likelihood include: - High number of accessways and intersections; - Visibility restrictions at driveways; - High traffic volumes; - High mix of HCV's v cyclists; - High operating speeds for vulnerable users (>30 km/h); - no formal on-road cycle lanes or separated facilities Factors that decrease the likelihood include: - Footpaths on both sides of SH1; - Formal pedestrian (zebra) crossings - not raised; - Lighting; - Generally straight and flat alignment;	Factors that increase the likelihood include: - No median separation (only standard centreline); - Curve road alignment; Factors that decrease the likelihood include: - Pavement appears to be mostly in good condition; - Generally flat alignment; - Good delineation; - 50 km/h posted speed limit
Likelihood score:	2 / 4	2 / 4	3 / 4	2.5 / 4	2 / 4	2 / 4	3 / 4	2 / 4
Severity comments:	Factors that increase the severity include: - No physical protection (barriers); - Numerous roadside hazards (e.g. Utility Poles); Factors that decrease the severity include: - Impact speeds likely to be less than Safe System boundary conditions (i.e. < 30-40 km/h for impact to roadside hazard);	Factors that increase the severity include: - No physical protection (e.g. median island); Factors that decrease the severity include: - Impact speeds likely to be less than Safe System boundary conditions (i.e. < 70 km/h for head-on);	Factors that increase the severity include: - High-impact angles; - High HCV volumes; Factors that decrease the severity include: - Impact speeds likely to be less than Safe System boundary conditions (i.e. < 50 km/h for side impact);	Factors that increase the severity include: - High-impact angles; - High HCV volumes; Factors that decrease the severity include: - Impact speeds likely to be less than Safe System boundary conditions (i.e. < 50 km/h for side impact);	Factors that increase the severity include: - High-impact angles; - High HCV volumes; Factors that decrease the severity include: - Impact speeds likely to be less than Safe System boundary conditions (i.e. < 50 km/h for side impact);	Factors that increase the severity include: - Impact speeds exceed Safe System boundaries (≥ 20-30 km/h), likely ≥ 40 km/h; Factors that decrease the severity include: - None identified;	Factors that increase the severity include: - Impact speeds exceed Safe System boundaries (≥ 20-30 km/h), likely ≥ 40 km/h; Factors that decrease the severity include: - None identified;	Factors that increase the severity include: - Impact speeds exceed Safe System boundaries (≥ 20-30 km/h), likely ≥ 40 km/h; Factors that decrease the severity include: - None identified;
Severity score:	2 / 4	2 / 4	2.5 / 4	2.5 / 4	2 / 4	4 / 4	4 / 4	4 / 4
Product:	16 / 64	16 / 64	30 / 64	25 / 64	16 / 64	32 / 64	36 / 64	32 / 64
							TOTAL	203 / 512

Table 5.3-2 - Safe System Assessment Matrix – *Proposed*

Safe System Assessment - SSA Matrix : Option - Streets for People								
	Run-off-road	**Head-on**	**Intersection-1 (SH1/Ruataniwha St) (SH1/Ruataniwha St)**	**Intersection-Other**	**Other**	**Pedestrian**	**Cyclist**	**Motorcyclists**
Exposure comments:	AADT from MobileRoad 2021 estimate: - SH1: 10,129 vpd; 8% HCV AADT > 10,000 vpd.	AADT from MobileRoad 2021 estimate: - SH1: 10,129 vpd; 8% HCV AADT > 10,000 vpd.	AADT from MobileRoad 2021 estimate: - SH1: 10,129 vpd; 8% HCV Combined AADT > 10,000 vpd.	AADT from MobileRoad 2021 estimate: - SH1: 10,129 vpd; 8% HCV Combined AADT > 10,000 vpd.	AADT from MobileRoad 2021 estimate: - SH1: 10,129 vpd; 8% HCV AADT > 10,000 vpd.	No data available, however, urban environment with main street shopping etc. Assume >100 units per day	No data available, however, urban environment with main street shopping etc. Expect an increase in cycle volumes with the improved facilities. Assume >100 units per day	Assumed 1% of AADT as data is not available. Motorcyclists volumes of more than 100 units per day, given that AADT >10,000 vpd.
Exposure score:	4 / 4	4 / 4	4 / 4	4 / 4	4 / 4	4 / 4	4 / 4	4 / 4
Likelihood comments:	Factors that increase the likelihood include: - Curved road alignment; - additional roadside objects (planter boxes) and clutter, potentially increasing distraction	Factors that increase the likelihood include: - No median separation (only standard centreline); - Curve road alignment; - slightly narrower lanes, leading to more head-on impacts	Factors that increase the likelihood include: - Moderate/high traffic volumes on through road; ~~- Priority control T-intersection;~~ ~~- Left-turn slip lane (masking issues);~~ - High percentage of HCVs; - Intersection in close proximity; - Proposed roundabout (can see an increase in crashes, although at lower speed and inmpact angle)	Factors that increase the likelihood include: - Priority control T-intersection type; - Waverley Street: low angle high speed left turn; - Victoria Street: Railway immediately to the east; Short stacking distance; - Kerbside parking in close proximity, restricting sightlines;	Factors that increase the likelihood include: - Kerbside parking (side-swipe or rear-end); - Impact with vehicles entering / exiting numerous driveways;	Factors that increase the likelihood include: - High number of accessways and intersections; - Visibility restrictions at driveways; - High traffic volumes; - High operating speeds for vulnerable users (>30 km/h);	Factors that increase the likelihood include: - High number of accessways and intersections; - Visibility restrictions at driveways; - High traffic volumes; - High mix of HCV's v cyclists; - High operating speeds for vulnerable users (>30 km/h); ~~- no formal on-road cycle lanes or separated facilities~~	Factors that increase the likelihood include: - No median separation (only standard centreline); - Curve road alignment; - slightly narrower lanes, leading to more head-on impacts
	Factors that decrease the likelihood include: - Pavement appears to be mostly in good condition; - Moderate shoulders with kerbside parking; - Generally flat alignment; - Good delineation; - 50 km/h posted speed limit; - Lanes narrowed to 3.4 m; - Additional delineation; - Raised platforms and other measures helping to reduce mean speeds	Factors that decrease the likelihood include: - Pavement appears to be mostly in good condition; - Generally flat alignment; - Good delineation; - 50 km/h posted speed limit - Additional delineation; - Raised platforms and other measures helping to reduce mean speeds	Factors that decrease the likelihood include: - 50km/h speed environment - Right-turn bay; - Lighting; - Proposed temporary roundabout - less confusing layout; - Raised platforms, reducing speed on approach	Factors that decrease the likelihood include: - 50km/h speed environment - Flag Lighting;	Factors that decrease the likelihood include: - Pavement appears to be mostly in good condition; - Moderate shoulders with kerbside parking; - Generally flat alignment; - Good delineation; - 50 km/h posted speed limit	Factors that decrease the likelihood include: - Footpaths on both sides of SH1; - Formal pedestrian (zebra) crossings - not raised; - Lighting; - Generally straight and flat alignment; - Raised pedestrain crossings, reducing approach and impact speeds; - Separated cycleway removes cyclists from footpath	Factors that decrease the likelihood include: - Footpaths on both sides of SH1; - Formal pedestrian (zebra) crossings - not raised; - Lighting; - Generally straight and flat alignment; - Raised pedestrain crossings, reducing approach and impact speeds; - Separated cycleway removes cyclists from footpath; - Improved cycle facilities and delineation (signs and lines);	Factors that decrease the likelihood include: - Pavement appears to be mostly in good condition; - Generally flat alignment; - Good delineation; - 50 km/h posted speed limit - Additional delineation; - Raised platforms and other measures helping to reduce mean speeds
Likelihood score:	2 / 4	2 / 4	3 / 4	2.5 / 4	2 / 4	1.5 / 4	2 / 4	2 / 4
Severity comments:	Factors that increase the severity include: - No physical protection (barriers); - Numerous roadside hazards (e.g. Utility Poles);	Factors that increase the severity include: - No physical protection (e.g. median island);	Factors that increase the severity include: ~~- High-impact angles;~~ - High HCV volumes;	Factors that increase the severity include: - High-impact angles; - High HCV volumes;	Factors that increase the severity include: - High-impact angles; - High HCV volumes;	Factors that increase the severity include: ~~- Impact speeds exceed Safe System boundaries (≥ 20-30 km/h), likely ≥ 40 km/h;~~	Factors that increase the severity include: ~~- Impact speeds exceed Safe System boundaries (≥ 20-30 km/h), likely ≥ 40 km/h;~~	Factors that increase the severity include: ~~- Impact speeds exceed Safe System boundaries (≥ 20-30 km/h), likely ≥ 40 km/h;~~
	Factors that decrease the severity include: - Impact speeds likely to be less than Safe System boundary conditions (i.e. < 30-40 km/h for impact to roadside hazard); - slight decrease in speed environment possible	Factors that decrease the severity include: - Impact speeds likely to be less than Safe System boundary conditions (i.e. < 70 km/h for head-on); - slight decrease in speed environment possible	Factors that decrease the severity include: - Impact speeds likely to be less than Safe System boundary conditions (i.e. < 50 km/h for side impact); - lower speed and impact angle	Factors that decrease the severity include: - Impact speeds likely to be less than Safe System boundary conditions (i.e. < 50 km/h for side impact);	Factors that decrease the severity include: - Impact speeds likely to be less than Safe System boundary conditions (i.e. < 50 km/h for side impact);	Factors that decrease the severity include: - None identified; - Impact speeds likely to be approaching Safe System boundaries (≥ 20-30 km/h), likely about 30 km/h;	Factors that decrease the severity include: - None identified; - Impact speeds likely to be approaching Safe System boundaries (≥ 20-30 km/h), likely about 30 km/h;	Factors that decrease the severity include: - None identified; - Impact speeds likely to be approaching Safe System boundaries (≥ 20-30 km/h), likely about 30 km/h;
Severity score:	2 / 4	2 / 4	2 / 4	2.5 / 4	2 / 4	3 / 4	3 / 4	3 / 4
Product:	16 / 64	16 / 64	24 / 64	25 / 64	16 / 64	18 / 64	24 / 64	24 / 64
							TOTAL	163 / 512

Waipawa Streets for People Detailed Design Stage SSA Rev 0_pdf

Document Status CLIENT REVIEW

Revision	Prepared by:	Reviewed by:		Approved by:		
		Name	Signature	Name	Signature	Date
0	Jonno Fletcher	Tony Harrison		Tony Harrison		28/03/2024