

Project Number: 5-C4006.00

P2M Walking & Cycling Link

Detailed Design Road Safety Audit

CONFIDENTIAL



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Document Details:

Date: 22 September 2021
Reference: 5-C4006.00
Status: DRAFT

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Document History and Status

Revision	Date	Author	Reviewed by	Approved by	Status
A	2021-09-22	s 9(2)(a)			Draft
B	2021-09-29				Issue 1

Revision Details

Revision	Details
A	Initial draft release
B	Issue 1 – following debrief meeting and receipt of revised drawings

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1 Background

1.1 Safety Audit Procedure

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

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

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

The primary objective of a road safety audit is to deliver a project that achieves an outcome consistent with Safer Journeys and the Safe System approach, that is, minimisation of death and serious injury. The road safety 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 road safety audit is summarised as:

“To deliver completed projects that contribute towards a safe road system that is increasingly free of death and serious injury by identifying and ranking potential safety concerns for all road users and others affected by a road project”

A road safety audit should desirably 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 road safety 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 designer on the type of improvements that might be appropriate. It is not intended to be prescriptive and other ways of improving the road safety or operational problems identified should also be considered.

In accordance with the procedures set down in the “NZTA Road Safety Audit Procedures for Projects Guidelines - Interim release May 2013” the audit report should be submitted to the client who will instruct the designer to respond. The designer 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 recommendation that is accepted, the client shall make the final decision and brief the designer to make the necessary changes and/or additions. As a result of this instruction the designer shall action the approved amendments. The client may involve a safety engineer to provide commentary to aid with the decision.

Decision tracking is an important part of the road safety 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 designer, safety engineer and client for each issue documenting the designer response, client decision (and asset manager’s comments in the case where the client and asset manager are not one and the same) and action taken.

A copy of the report including the designer’s response to the client and the client’s decision on each recommendation shall be given to the road safety audit team leader as part of the important feedback loop. The road safety audit team leader will disseminate this to team members.

1.2 The Safety Audit Team

The road safety audit was carried out in accordance with the NZTA Road Safety Audit Procedure for Projects Guidelines - Interim release May 2013, by:

- s 9(2)(a) Principal Transportation Engineer, WSP – Safety Audit Team Leader
- s 9(2)(a) Transportation Engineer, WSP – Safety Audit Team Member

The Safety Audit Team (SAT) did not attend a pre-audit briefing, as the SAT Leader was already familiar with the project from previous RSAs. Instead, the SAT met and reviewed the drawings on the afternoon of Thursday 16 September to review the designs and identify issues.

The site visit to the public area of the carpark was conducted on Sunday 19 September 2021 between 2:00pm and 3:00pm, to confirm our understanding of the site and note issues that a desktop review of drawings wouldn’t identify.

1.3 Report Format

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

The expected crash frequency is qualitatively assessed based on 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 based on factors such as expected speeds, type of collision, and type of vehicle involved.

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 Concern Assessment Rating Matrix in Table 1 below. The qualitative assessment requires professional judgement and a wide range of experience in projects of all sizes and locations.

Table 1 - Concern Assessment Rating Matrix

Severity (likelihood of death or serious injury)	Frequency (probability of a crash)			
	Frequent	Common	Occasional	Infrequent
Very likely	Serious	Serious	Significant	Moderate
Likely	Serious	Significant	Moderate	Moderate
Unlikely	Significant	Moderate	Minor	Minor
Very unlikely	Moderate	Minor	Minor	Minor

While all safety concerns should be considered for action, the client or nominated project manager will make the decision as to what course of action will be adopted based on the guidance given in this ranking process with consideration to factors other than safety alone. As a guide a suggested action for each concern category is given in Table 2 below.

Table 2 - Concern Categories

Risk	Suggested Action
Serious	A major 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 safety audit team to provide additional comments with respect to items that may have a safety implication but lie outside the scope of the safety audit. 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 or an opportunity for improved safety but not necessarily linked to the project itself. While typically comments do not require a specific recommendation, in some instances suggestions may be given by the auditors.

1.4 Scope of Audit

This Audit is a Detailed Design Stage Safety Audit of the detailed design drawings produced by Aecom for Waka Kotahi. While the full project extends all the way from Petone to Melling, the scope and extents of this RSA were in the vicinity of the Petone Station, between the northern end of the Station carpark and the southern end of the new underpass. This is shown in Figure 1 below.

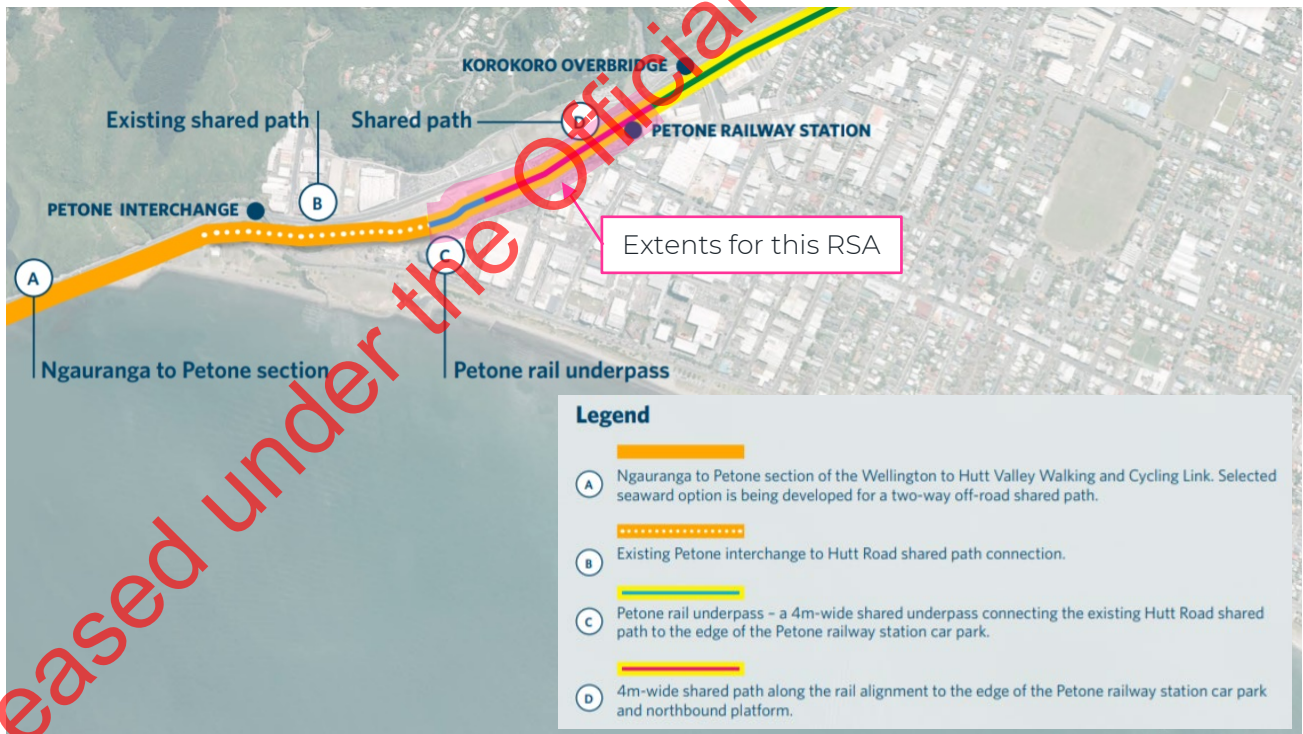


Figure 1: Extents for this RSA.

1.5 Documents Provided

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

- 60306339-SHT-LS-0002-3, Petone to Melling Signs and Markings Pavement Marking Schedule
- 60306339-SHT-LS-0003-3, Petone to Melling Sign Details Sheet 1
- 60306339-SHT-LS-0004-1, Petone to Melling Sign Details Sheet 2

- 60306339-SHT-LS-0021-5, Petone to Melling Linemarking and Signage – Plan Sheet 1 of 10
- 60306339-SHT-LS-0022-4, Petone to Melling Linemarking and Signage – Plan Sheet 2 of 10
- 60306339-SHT-LS-0023-4, Petone to Melling Linemarking and Signage – Plan Sheet 3 of 10

1.6 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 SAT. 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. Safety 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 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 safety audit team or their organisations.

1.7 Cycle, pedestrian and micro mobility user volumes

To understand the likely future use of the walking and cycling link, the SAT has used an excerpt from the demand estimates for the nearby section of Te Ara Tupua planned between Petone and Ngauranga¹, as shown in Table 3 to Table 5 below.

Table 3: Estimated average weekday use of Te Ara Tupua between Ngauranga and Petone.

Mode	Weekday Both ways, Base use 2024	Users by 2025 after path opening step change	Users by 2030 (based on growth of 10% p.a. (and 6% for peds) for 2025-2030)	Users by 2035 (based on growth of 5% p.a. for 2030-2035)	Users by 2050 (based on 2% p.a. growth after 2035)
Cyclists	715	1,359	2,189	2,794	3,760
Walkers/runners	5	272	364	465	626
Transport device riders	1	181	292	372	501
Total mean use	721	1812	2,845	3,631	4,887
95 th percentile	1,081	2,718	4,268	5,447	7,331

Note * - We expect that only around 50 of these walkers/runners will travel the full length of the path.

Table 4: Estimated average AM Peak hour use of Te Ara Tupua between Ngauranga and Petone.

Weekday AM Peak Hour Users	2025	2030	2035	2050
Cyclists	271	438	559	752
Walkers/runners	22	29	37	50
Transport device riders	27	44	56	75
Total	320	511	652	877
95 th percentile	480	767	978	1,316

¹ From Waka Kotahi Memorandum User Demand Assessment for N2P section of Te Ara Tupua dated 28 April 2020

Table 5: Estimated average weekend day use of Te Ara Tupua between Ngauranga and Petone.

Weekend-day Both ways	Users by 2025 after path opening step change	Users by 2030 (based on 10% p.a. growth after 2025)	Users by 2035 (based on 5% p.a. growth after 2030)	Users by 2050 (based on 2% p.a. growth after 2035)
Cyclists	1,087	1,751	2,235	3,008
Walkers/runners	490	655	837	1,127
Transport device riders	272	438	558	751
Total	1,849	2,844	3,630	4,886
95 th percentile	2,774	4,266	5,445	7,329

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AECOM Comment:

The number of existing cyclists per day on SH2 is assumed to be 210. This is for SH2 based on the Strategic Feasibility Study (NZTA (Opus) 2012). Counts from this study showed that P2M cyclist counts are approximately 40% of actual N2P cyclist numbers counted in that study. This gave an estimate of 130 cyclists per day that would use P2M after opening.

An estimated 110 new cyclists are estimated to be generated by P2M giving 240 cyclists per day on P2M estimated at opening.

The forecast cyclists per day for the P2M design is 1548 cyclists per day in 2050 and 173 pedestrians per day in the southern sections. **This is approximately 310 cyclists per hour and 55 pedestrians per hour in 2050.**

(Growth rates assumed are 2% per year up to opening, 100% uplift on opening then 10 % per annum for 5 years, 5% per annum for five years and 2% thereafter.

Safety Engineer's Comment:

Note that cycling numbers between Petone and Ngauranga grew by 8-9% p.a. between 2012-2019. This higher than expected level of growth is partly due to high uptake of e-bikes for long-distance cycle commutes.

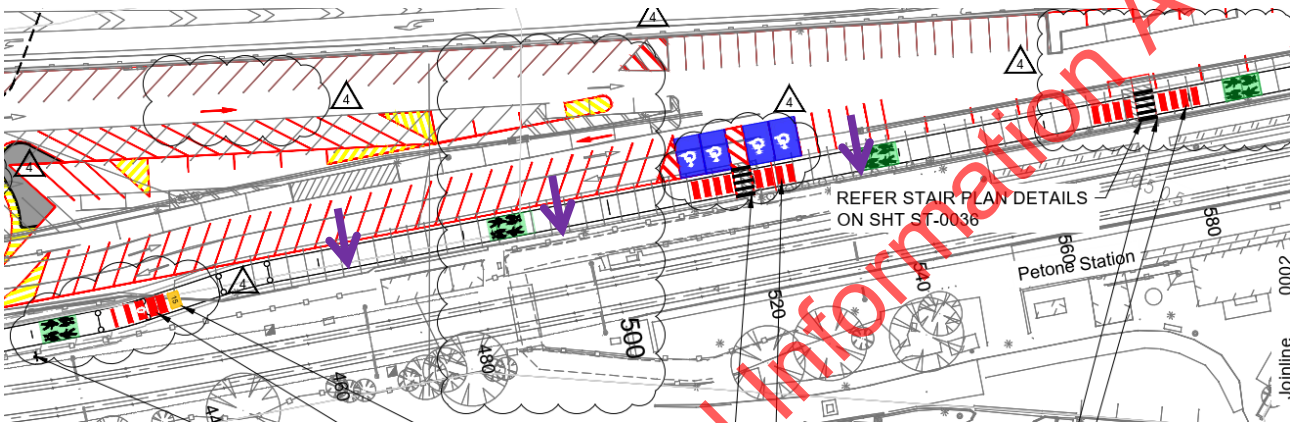
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2 Safety Audit Findings – Petone Station Carpark

2.1 Pedestrian – cyclist conflict on path outside station Significant

Where the shared path travels at the same level as and adjacent to parking spaces within Petone Station, large vehicles (e.g. vans) are likely to obscure intervisibility between cyclists travelling along the path and pedestrians crossing the path, between the park and ride and the Petone Station platform.

Pedestrians may appear out from between parked vehicles directly onto the path, leaving northbound cyclists in particular very little time to react to brake or avoid a collision.



Recommendation(s):

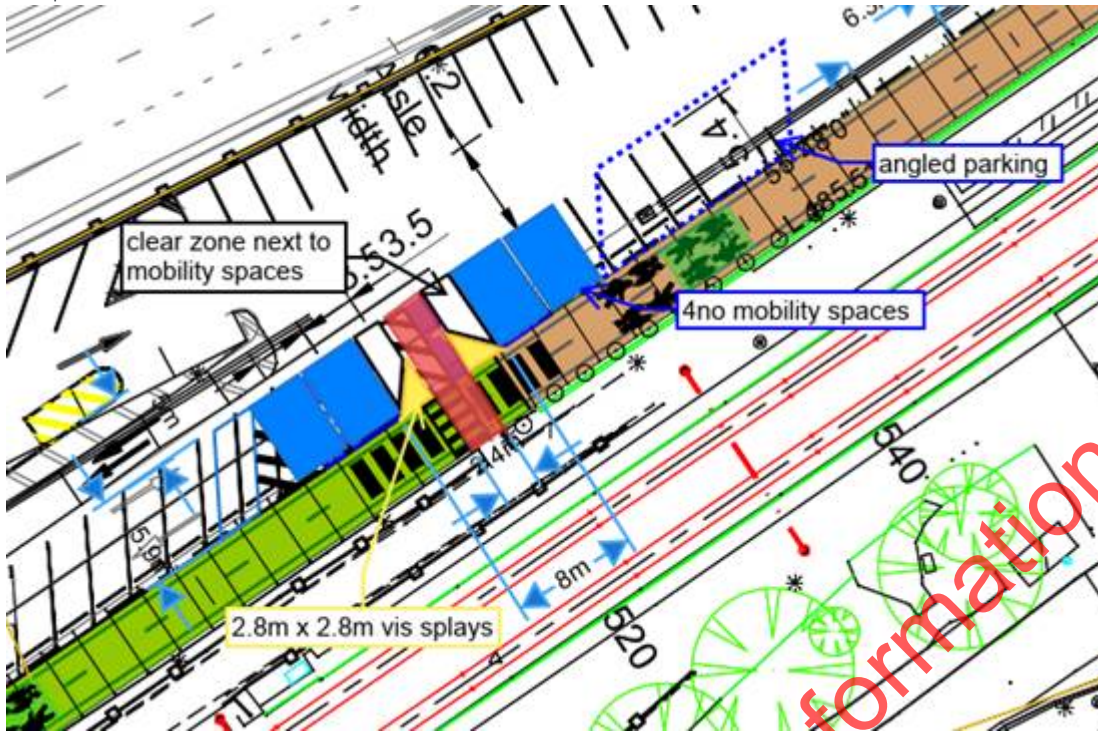
- 1 Ideally reconfigure the park and ride to ensure there is a (1.0-1.5m) gap between the front of vehicles and the shared path to improve intervisibility between pedestrians and cyclists.
- 2 If the above recommendation is not possible, install a painted buffer on the edge of the path where the vehicles abut so northbound cyclists ride closer to the centre of the path, out of the area where pedestrians may suddenly appear from between parked vehicles. A similar treatment is used where on-street parking is adjacent to a bi-directional facility in locations in Wellington City (Hutt Road – white dashed line, Oriental Parade – exposed aggregate separator strip).
- 3 Mark the warning block and slow symbol on the path in both directions prior to where cyclists would enter the section of path where these conflicts may occur, and where there are pedestrian desire lines, e.g. outside the stairs and where there are wider gaps between parking spaces abutting the shared path.
- 4 Where there are pedestrian desire lines because there is a gap between vehicles or a feature such as stairs up to the platform, mark zebra crossing bars (or other similar treatments) both across the shared path and in the parking aisle to direct pedestrians to these locations. The zebra crossings on the shared path should be proportional to the recently updated zebra bar widths and have limit lines to mimic the TCD crossing markings as closely as possible.

Frequency: <i>Crashes are likely to be Frequent</i>	Severity: <i>Death or serious injury is Unlikely</i>	Rating: <i>The safety concern is Significant</i>
Designer Response:	<i>In previous consultation with GWRC the capacity of the car park was a key issue. This resulted in the addition of the 'compensation car park' provision on the southern side of McKenzie Avenue. The number of parking spaces is part of a</i>	

	<p>property agreement and any change to the numbers would require approval of GWRC and changes to the property agreement</p> <ol style="list-style-type: none"> 1. This would have major implications on the layout and capacity of the car park. This will not be adopted. 2. Install 450mm hatch marking throughout the 0.5m margin zone ch441.6m to ch645.0m 3. Add "SLOW ZONE" markings and/or signage proposed at the entry point at either end of the shared area to supplement the other markings and changes (approx. ch20m & ch660m). 4. Zebra markings are included at the two crossing points, i.e. to the railway subway ramp (ch519m) and to the centre of the NB platform (ch574m). Whilst pedestrians may cross the car park and enter the shared path at virtually any point these are the two points where crossing of the path is intended. Exact layout to suit the TCD
<p><i>Safety Engineer:</i></p>	<p>1: The agreement with GWRC is still under negotiation and it may be possible to secure additional carparks, not to increase the gap but to provide additional LOS at crossing points, as discussed in debrief – refer to diagram in email (or Figure 5 in RTS-06). 2: Agree with suggestion 2. to include an edge-line 0.5m from the parking, preferably consistent with the marking used on the Hutt Rd cycleway (i.e. a dashed white line). 3: Agree with Designer response to add 'SLOW ZONE' markings to either end of the shared area. 4: Agree with Designer's response, but also note the importance to have at least white 4 bars on the path crossing (the change in the TCD rule is to have the space between the bars the same width as the bars themselves (i.e. 600mm) – this is to be scaled down for path crossings).</p>
<p><i>Client Decision:</i></p>	<p>GR: Designer to undertake recommendations 2, 3 & 4 as detailed in the Designer's Response and incorporating the Safety Engineer's comments. In addition, carparking layout will be modified to improve LOS at the southern designated crossing point as per proposed detail below. Please confirm asap what impact this change has on parking spaces.</p>
<p><i>Action Taken:</i></p>	<p>[</p>

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Proposed detail

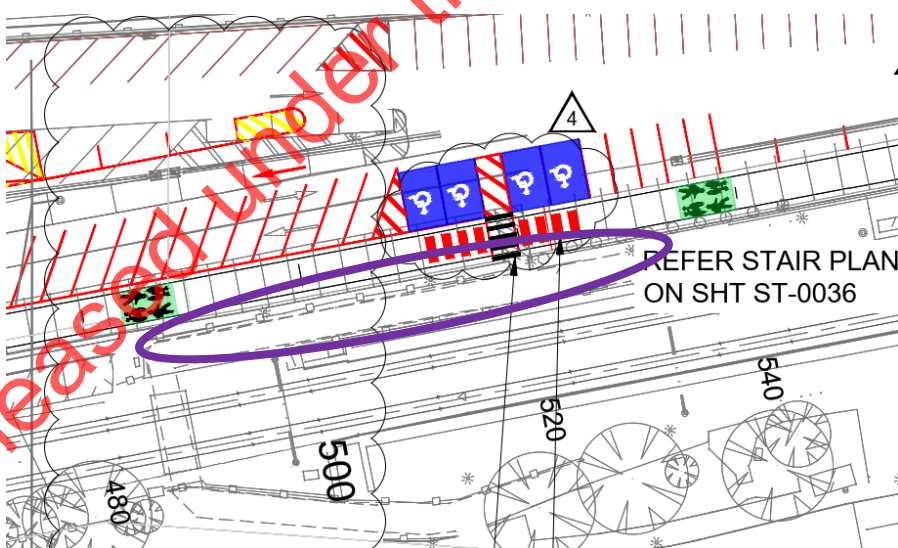


2.2 Height/fall restraints insufficient

Moderate

There are several locations in the project where there is a risk of fall, but where the existing fall restraints are insufficient to prevent cyclists, pedestrians or small children falling. These locations are:

- The balustrade beside the existing pedestrian underpass for Petone Station which will be directly adjacent to the shared path is not high enough for cyclists to prevent them falling off the shared path onto the underpass ramps.
- The balustrades on the steps connecting to the Petone Station platform from the park and ride do not have adequate measures to prevent small children falling through.





Recommendation(s):

1. Ensure all fall restraints adjacent to the shared path and other areas with increased cycle demand are 1.4m high.
2. Ensure all fall restraints are designed in accordance with the NZ building code with regard to gaps appropriate for small children.

<p>Frequency: <i>Crashes are likely to be Infrequent</i></p>	<p>Severity: <i>Death or serious injury is Very Likely</i></p>	<p>Rating: <i>The safety concern is Moderate</i></p>
<p>Designer Response:</p>	<p>1. As discussed at the review meeting the 1.4m balustrade requirement is to be relaxed to 1.2m in the near future, hence adopt 1.2m where appropriate. The building code F4 Falling from Height requires protection of any potential fall of 1.0m or over.</p> <p>2. Subway balustrade, GWRC have recently replaced the balustrade to the railway subway. This is typically between 1.0m and 1.2m high above the concrete plinth or timber edge beneath. The gap below the</p>	

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	<p>bottom rail is typically 170mm. The nearside edge of the path is between 0.9m and 1.2m from the balustrade and is separated by a standard kerb and gravel strip. Lighting columns for the car park are located in the gravel strip. Vertically, the top of the balustrade is typically >0.9m above the proposed path surface but does drop below 0.9m at the southern end adjacent the lower section of the balustrade. Taking into account the distance between the balustrade and the kerb/path edge the provision of an additional or higher balustrade is not considered necessary. However, the operators of the Station and car park (GWRC) will be advised of the SAT concerns. 3. Path adjacent the existing platform. The maximum fall height for the raised shared path section is 860mm at the central steps with the path falling back to the existing car park levels over approx. 20m either side. The proposed barrier is a guide and aide for path users. No change to the design proposed.</p>
Safety Engineer:	<p>Agree with Designer's response. 1.2m is adequate where the vaulting risk is low (as it is here). Less is acceptable where the fall is <1m and/or the barrier is set back from the through-route by >500mm.</p>
Client Decision:	<p>GR: No design change required – advise GWRC of safety concerns</p>
Action Taken:	<p>[</p>

2.3 Speed limit for vehicles entering the park and ride Moderate

The posted speed limit for vehicles in the park and ride facility is presently 50km/h. While most drivers would be unable to travel around the park and ride at this speed, it is well above the 30km/h survivable speed (based on Safe System Guidance) for cyclists and pedestrians.



Recommendation(s):

- 1 Reduce speed limit in park and ride to 30km/h or less.
- 2 Install speed management measures such as speed humps in the park and ride to reduce speeds prior to conflict points, or where there are long straight sections of parking aisle where driver speeds could be higher.

Frequency: <i>Crashes are likely to be Infrequent</i>	Severity: <i>Death or serious injury is Likely</i>	Rating: <i>The safety concern is Moderate</i>
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Designer Response:	[The operation of the car park is the responsibility of GWRC. No actions on behalf of the project are proposed. The concerns raised by the SAT will be passed onto GWRC with a recommendation that the signage is changed.
Safety Engineer:	Agree with the Designer's response. The operating speed in the car park is low.
Client Decision:	GR: No design change required – advise GWRC of safety concerns
Action Taken:	[

2.4 Discussion of fence between cycleway and carpark

Waka Kotahi have requested the SAT comment on the safety implications of a fence between the cycleway and the carpark to only permit pedestrians to enter the shared path at certain locations.

The SAT do not support the use of a fence for the above purpose for the following reasons:

- The fencing would force pedestrians to take longer routes through the carpark (rather than the most direct route to the shared path) putting them at more risk of being hit by either reversing vehicles or vehicles travelling through the car park (compared to an option without a fence). Incidents between vehicles and pedestrians are much more likely to result in serious injury or death than between cyclists and pedestrians on a shared path. Children are particularly at risk with reversing vehicles.
- The fencing would likely reduce the width of the shared path as it would need to be offset from the parking, the effective width would also be reduced due to the shy distance of cycling adjacent to a continuous vertical element. This could in turn result in increased potential for conflicts between users on the shared path.

Designers Response

Noted, agree with the SAT

Safety Engineer's Response

Noted, and also agree with the SAT and Designer

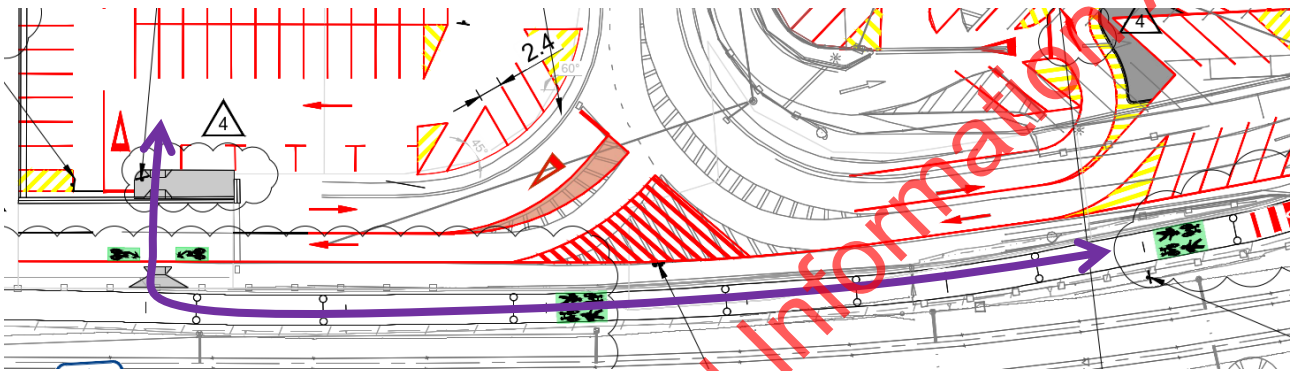
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3 Safety Audit Findings – MacKenzie Ave Overbridge

3.1 Pedestrian-cyclist conflict on path where pedestrians walk along path

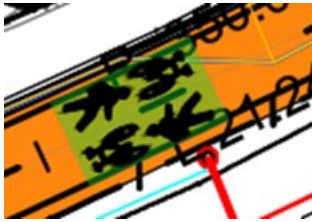
Minor

Where the path passes nearby the overflow parking south of the MacKenzie Ave overbridge, it is likely pedestrians will cross the road and walk north along the shared path to the Station Platform and underpass, or vice versa when travelling in the other direction. Although during peak hours pedestrians doing this movement will likely be travelling the opposite direction along the path to cyclists, there is still a possibility of collisions.



Recommendation(s):

- 1 Install keep left and “share with care” (or similar) reminders along the path in areas where there are likely to be numerous pedestrians walking along the path.

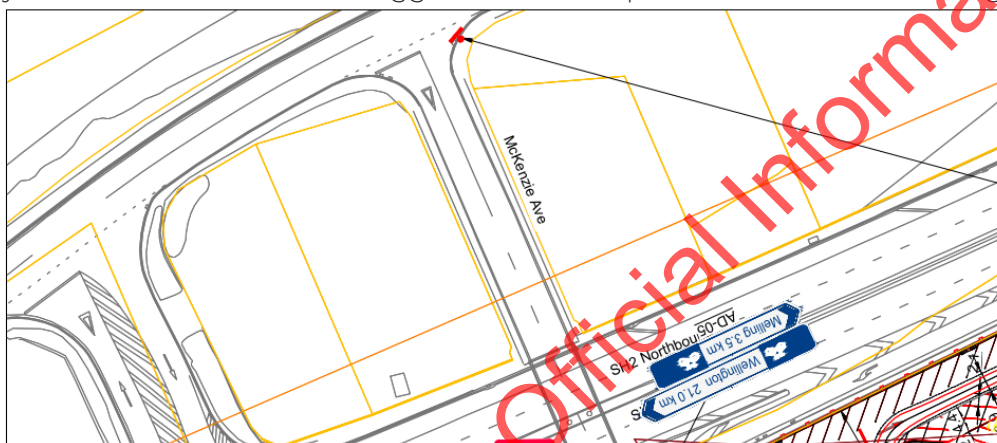
Frequency: <i>Crashes are likely to be Occasional</i>	Severity: <i>Death or serious injury is Unlikely</i>	Rating: <i>The safety concern is Minor</i>
Designer Response:	There are pedestrian/cyclist markings either side of this entry point that indicate a shared path and a direction of travel, i.e. keep left. These are 40m and 50m either side.	
	 <p>Add warning bar markings along the path at the point of entry, approx. 10m length. Add “LOOK BOTH WAYS” text on both sides of the crossing point entry to/from the access road</p>	
Safety Engineer:	‘Share with Care’ markings tend to be ineffective. Agree with Designer that the pedestrian/cycle markings should be sufficient on the path in this area, however suggest that they could better influence the behaviour of pedestrians if the ped/cycle marking to the north of the access point were moved 30m south, so it is visible	

	immediately after entering the path. Suggest adding warning TGSIs at pedestrian approach to the SUP. That will suggest to pedestrians that they should look both ways (without the visual clutter of 'LOOK BOTH WAYS' markings).
Client Decision:	GR: Design change as per Safety Engineer's comments
Action Taken:	[

3.2 MacKenzie Ave overbridge pedestrian connections and wayfinding

Minor

Pedestrians are presently not allowed on the MacKenzie Ave overbridge, which is appropriate given that there is no footpath and steep vertical geometry with poor visibility. However; the proposed wayfinding signs on either side of MacKenzie Ave overbridge include instructions for cyclists but do not include a suggested route for pedestrians to avoid walking over the overbridge.



1 | DETAIL (McKenzie Ave Overbridge)

Scale 1:500 (A1)



Recommendation(s):

- 1 Install wayfinding signs for pedestrians (via appropriate routes) near the overbridge.

Frequency: Crashes are likely to be Infrequent	Severity: Death or serious injury is Unlikely	Rating: The safety concern is Minor
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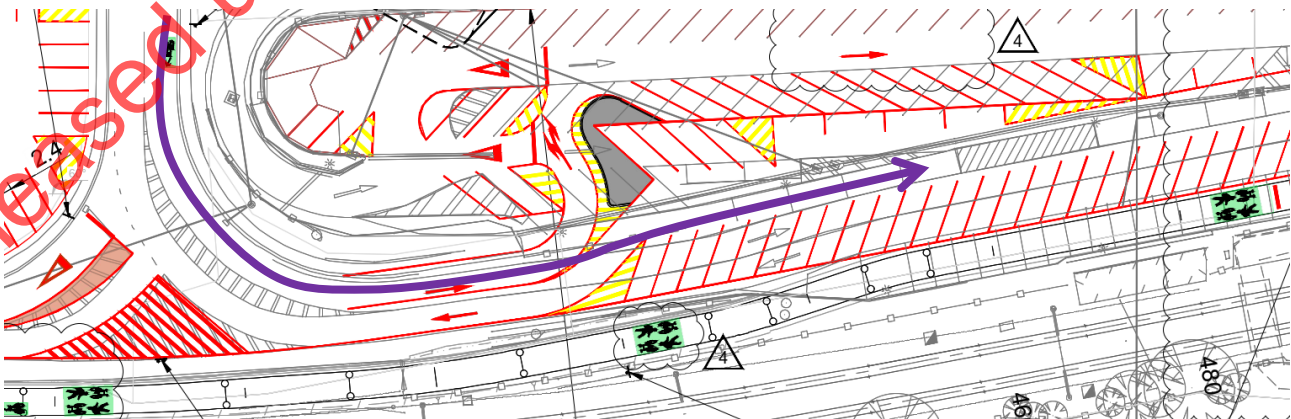
Designer Response:	McKenzie Avenue has no footpaths and is unsuitable as a pedestrian route. This route is unlikely to be used by pedestrians and signage to the pedestrian overbridge is a decision for Waka Kotahi.
Safety Engineer:	Agree with SAT, noting that many walkers/runners exit the Korokoro Walkway nearby. Suggest wording of the proposed cycleway sign be changed from 'Shared Path' to 'Te Ara Tupua' (as 'Shared Path' reads like an invitation to pedestrians) and a new sign be added at this point. '<-- Pedestrian overbridge to Railway Station 300m' with a pedestrian symbol at the top.
Client Decision:	GR: There are already pedestrian no-go signs in place so not exactly an invitation. So instead of 2 new signs preferably the wayfinding information can be conveyed in one sign E.g. 'Te Ara Tupua' with a pedestrian symbol with arrow in direction of pedestrian overbridge 300m, and cyclist symbol with arrow in direction of McKenzie overbridge
Action Taken:	[
Existing signage	



3.3 Northbound cyclists from MacKenzie Ave riding the wrong way through the park and ride aisle

Moderate

For cyclists heading northbound onto the path from MacKenzie Ave, the recommended route (shown through the markings on the plans) would take cyclists in the wrong direction before they can enter the path. This is likely to lead to cyclists riding the wrong way along the parking aisle, which increases the risk of drivers exiting angle parking spaces reversing into cyclists, as drivers would not expect to see or look for cyclists performing this movement.

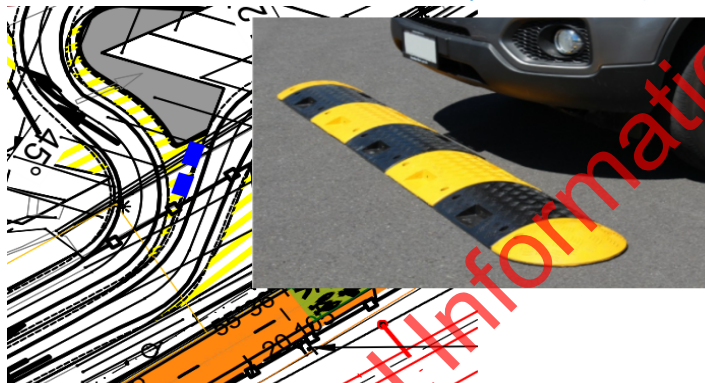


Recommendation(s):

- 1 If possible, install a drop-kerb from MacKenzie Ave to the path to prevent this movement through the carpark.

Frequency:	Severity:	Rating:
Crashes are likely to be Infrequent	Death or serious injury is Likely	The safety concern is Moderate

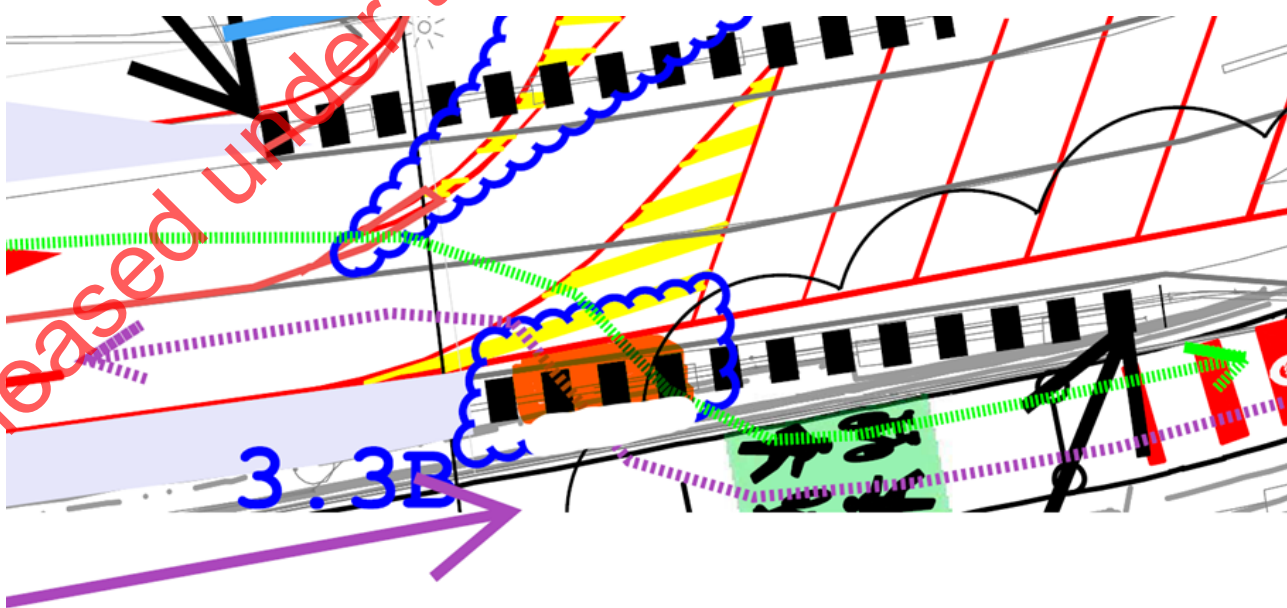
Designer Response: Although cyclist numbers heading northbound onto the path from McKenzie Ave are expected to be low it is correct that the route through the exit lane of the car park is more direct and potentially more attractive, despite the hazards identified, although not legal. The direct route through the car park indicated by the SAT above, is also used by KiwiRail as route for large maintenance vehicles to gain access to the track area north of the car park. KiwiRail vehicles cannot use the access direct off SH2 or the signed route through the car park. In order to discourage this route being used by cyclists install low speed bumps within the hatched area or immediately to the north (exact position tbc)



Safety Engineer: [Agree with SAT's suggestion to add a drop-kerb to allow for direct/coherent access between the path north of Petone Stn and Pito-One Rd, thus reducing the risk of riders cycling through the car park.

Client Decision: GR: Install a drop kerb and remove w-beam, as per sketch 3.3B below

Action Taken: []
 Proposed drop-kerb option 3.3B

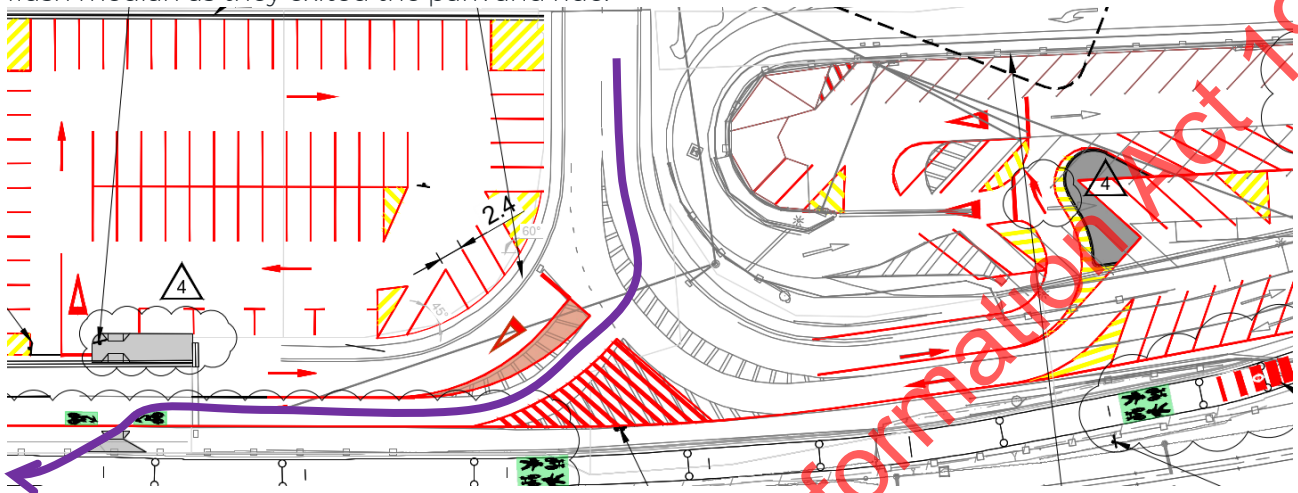


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3.4 Cyclists waiting to turn on MacKenzie Ave flush median

Significant

The flush median is in an area with poor forwards visibility due to the vertical geometry of the MacKenzie Ave overbridge and will be used by cyclists to wait while performing turning manoeuvres to the path. While on site, several vehicles were observed cutting the corner over the flush median as they exited the park and ride.



Recommendation(s):

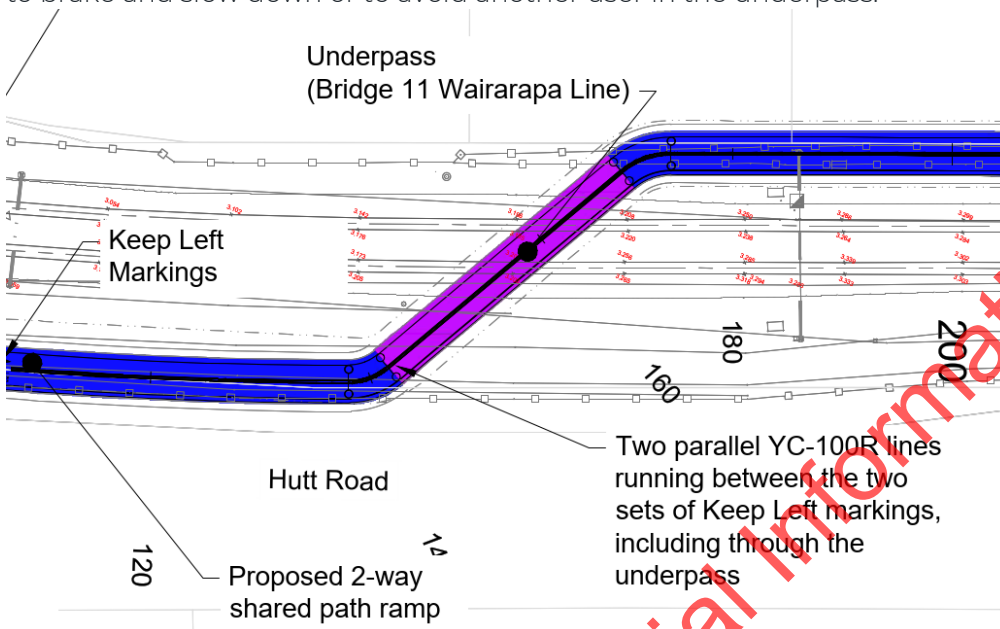
- 1 Install a turning treatment on the median for cyclists to ensure drivers are aware that cyclists use this area and are physically prevented from cutting the corner. Several good designs are presently installed on Evans Bay Parade in Wellington with green coloured surfacing on the flush median and safe hit posts preventing vehicle cutting into the flush median area.

Frequency: <i>Crashes are likely to be Occasional</i>	Severity: <i>Death or serious injury is very Likely</i>	Rating: <i>The safety concern is Significant</i>
Designer Response:	The right turn manoeuvre is and will continue to be used by college traffic, car park users and cyclists. Amend the existing central hatching to reflect these movements and add reflective road studs along the approach from the station car park to direct drivers to stay left	
Safety Engineer:	Agree with the Designer's response.	
Client Decision:	GR: Change as per Designer's response	
Action Taken:	[

4 Safety Audit Findings – New Underpass

4.1 Cyclist forward visibility and conflicts in underpass Moderate

The horizontal and vertical geometry of the new underpass restricts forwards visibility. The SAT are concerned a cyclist travelling at speed down the underpass ramps would not have enough time to brake and slow down or to avoid another user in the underpass.



Recommendation(s):

- 1 Install convex mirrors on the outside of the curves to allow approaching pedestrians and cyclists to see into the underpass from the ramps; or
- 2 Install a radar or other detection system with electronic warning signs to warn of approaching users from the opposite direction on both approaches to the underpass.

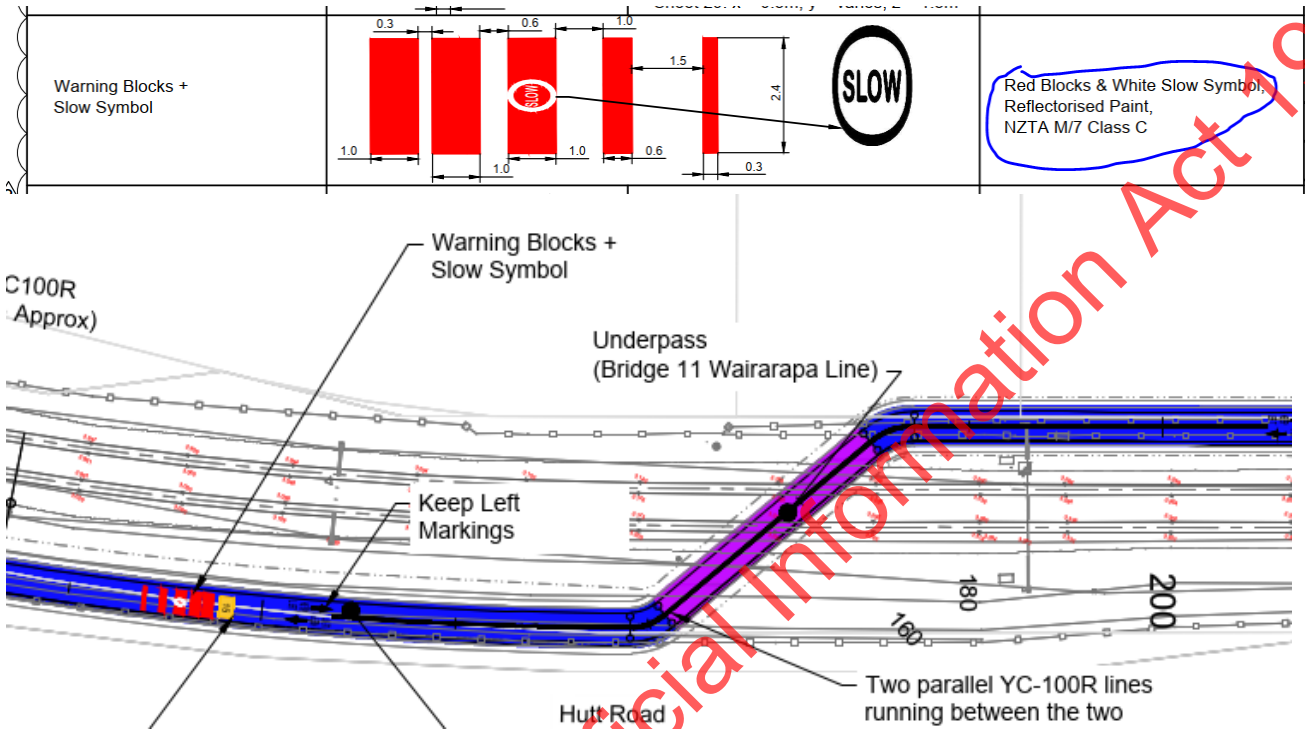
Frequency: <i>Crashes are likely to be Common</i>	Severity: <i>Death or serious injury is Unlikely</i>	Rating: <i>The safety concern is Moderate</i>
Designer Response:	[The lining arrangement through the underpass is considered appropriate. The approach signage and markings have been repositioned and added to in order to reinforce the low speed and shared environment. No further action is proposed	
Safety Engineer:	[Agree with the Designer's response. Encouraging better lane discipline within the underpass itself could be achieved by including a pair of direction arrow markings around Ch 160. Convex mirrors are an option to reconsider after we see how well the path operates.	
Client Decision:	GR: Design as per Designer's response plus direction arrow marking within the underpass (to encourage pedestrians to stay in their lane)	
Action Taken:	[

4.2 Red blocks reflectorised paint skid resistance Moderate

On the pavement marking schedule, the red warning blocks and slow symbol materials are reflectorised paint. In the line marking and sign plans, the warning blocks and slow symbol are

marked on the ramps into the underpass, where cyclists travelling down the ramps towards the underpass will brake to reduce speeds prior to the curve into the underpass.

Reflectorised paint does not have good skid resistance, and large blocks of reflectorised paint should be avoided in areas where there are high braking demands to avoid loss of control under braking.



Recommendation(s):

- 1 Materials for red warning blocks should all be calcined bauxite or otherwise in accordance with the P33 coloured surfacing specification

Frequency: Crashes are likely to be Common	Severity: Death or serious injury is Unlikely	Rating: The safety concern is Moderate
Designer Response:	The markings specifications have been amended.	
Safety Engineer:	Agree with Designer's response.	
Client Decision:	GR: Design as per Designer's response	
Action Taken:	[

5 Safety Audit Findings – Whole Project

5.1 Tactile pavers for vision-impaired pedestrians

Minor

There do not appear to be any directional or tactile pavers installed where pedestrians will need to cross the shared path in the vicinity of the train station. Otherwise vision impaired pedestrians may not be aware they're entering a high-conflict area and more prone to conflicts with cyclists on the shared path.

Recommendation(s):

- 1 Install tactile and directional pavers for vision impaired pedestrians where necessary throughout the Petone Station park and ride facilities and near the shared path.

Frequency:	Severity:	Rating:
Crashes are likely to be Infrequent	Death or serious injury is Very Unlikely	The safety concern is Minor
Designer Response:	The two locations where pedestrian movements cross the shared path alignment are at the existing subway (ch520m) and at the central platform access (ch675m). Additional tactile pavers to be included at these locations.	
Safety Engineer:	Agree with Designer's response.	
Client Decision:	GR: Design as per Designer's response	
Action Taken:	[

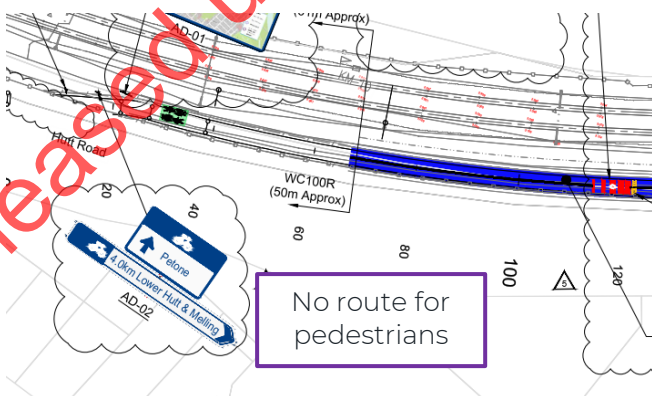
5.2 Wayfinding signs

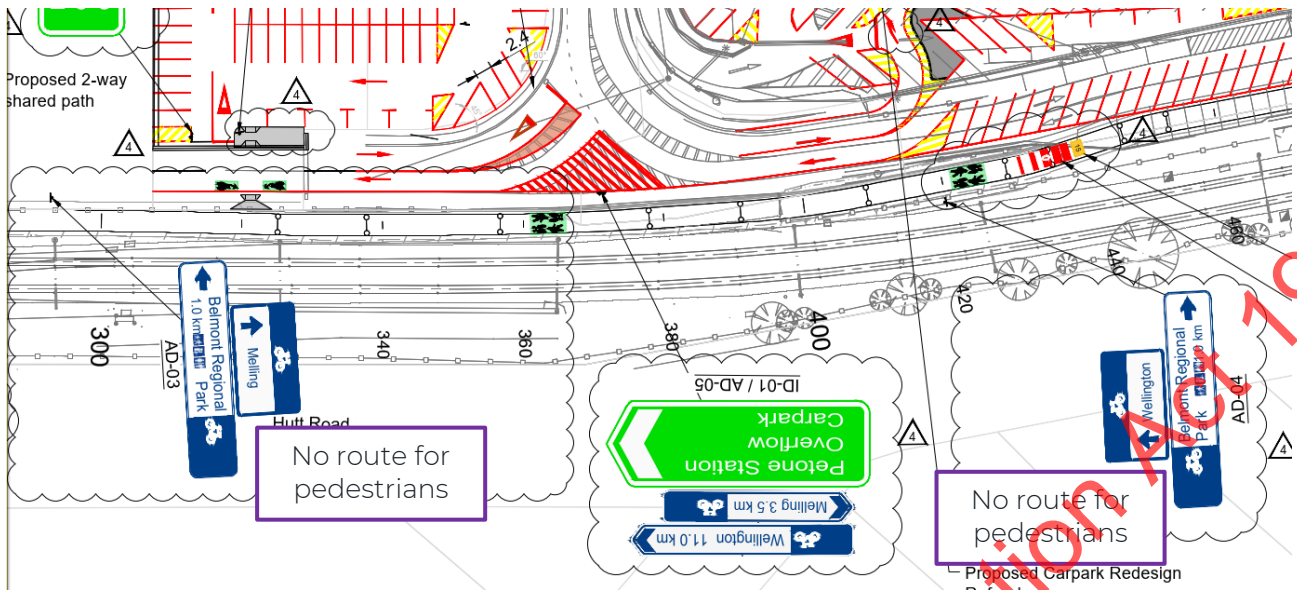
Minor

There are several areas of the project where wayfinding signs provide directions for cyclists to/from the shared path, but do not provide any directions for pedestrians where there is already a better existing route for pedestrians to follow than walking along the path. Examples include:

- Guidance directing pedestrians along the footpath adjacent to Hutt Road and then through the existing underpass to Petone Station.
- Pedestrian access to Belmont Regional Park near MacKenzie Ave overbridge.

In addition, there are several areas where the wayfinding signs do not provide consistent information for both pedestrians and cyclists, in terms of following the advance direction, intersection direction and confirmation direction methodology, which may result in less familiar users not turning off in the correct location to go where they intend.





Recommendation(s):

- 1 Amend wayfinding signs to inform northbound pedestrians of the existing footpath and underpass route to Petone Station at the southern terminus of the project.
- 2 Install wayfinding signs for the pedestrian route to Belmont Regional Park.
- 3 Review destinations along the route with the preferred route through the project area separately for pedestrians and cyclists to ensure advance direction, intersection direction and confirmation direction signs are installed in appropriate places.

Frequency:	Severity:	Rating:
Crashes are likely to be Infrequent	Death or serious injury is Very Unlikely	The safety concern is Minor
Designer Response:	<p>Amend wayfinding signs to inform northbound pedestrians of the existing footpath and underpass route to Petone Station at the southern terminus of the project.</p> <p>The station office is on the southbound platform and is a likely first destination for passengers heading in either direction. The existing subway for the station gives access to the northbound platform without accessing the shared path.</p> <p>Additional pedestrian signage at the new subway is not considered necessary.</p> <p>Install wayfinding signs for the pedestrian route to Belmont Regional Park.</p> <p>Add appropriate signage via the existing Petone Station overbridge (subject to the approval of GWRC).</p> <p>Review destinations along the route with the preferred route through the project area separately for pedestrians and cyclists to ensure advance direction, intersection direction and confirmation direction signs are installed in appropriate places.</p> <p>Noted</p>	
Safety Engineer:	<p>1: Agree with SAT. Visitors to the area may not be aware of the existence of the old subway. Wayfinding at the intersection of Hutt Rd and the new subway would be helpful for them (and potentially reduce pedestrian use of the SUP subway). 2: Agree with Designer's response.</p>	

Client Decision:	GR: Design as per Safety Engineer's response
Action Taken:	[

5.3 Suitability and ongoing maintenance of existing wayfinding signs in the area not removed

Comment

There are multiple wayfinding signs for pedestrians and cyclists in the vicinity of the project which direct users to the existing path, which would no longer be the preferred route following construction. The removal of these signs is not shown in the drawings, and there are safety in design issues associated with the ongoing maintenance of irrelevant signs that aren't removed, as well as poor information provided to potential path users which would inconvenience them. One example is shown in the image below on Hutt Road.



Recommendation(s):

- 1 Review existing wayfinding signs in the area and remove if no longer relevant given the new route.

Designers Response

A review of existing wayfinder signage in the area will be undertaken by Waka Kotahi in conjunction with Hutt City Council

Safety Engineer's Response

An ongoing review will be needed as the wider cycling network is developed.

5.4 Design issues with consistency and legal implications

Comment

This section lists all other comments on the designs, especially around consistency with other standard treatments and legality/intended use of signs and markings:

1. Zebra crossing bars in park and ride and on shared path – although these are not legal crossings, the more closely they mimic a legal crossing the better behaviour compliance will be. Previous advice to the SAT on other projects is that there should be a minimum of four zebra bars.
2. Treatments at cycle kerb cuttings/ramps are not consistent with other treatments successfully used around the Wellington Region, which typically include cycle symbols and/or green coloured surfacing between the road and the ramp.
3. The ID-01 'Petone Station Overflow Carpark' sign does not have the correct font and text height used for guide signs in New Zealand in accordance with TCD. In addition, the sign should be coloured blue rather than green since it's not on a state highway.
4. The PW25 '15' advisory pavement markings used on approach to the underpass are not typical pavement marking treatments for advisory speeds and are usually reserved for signs. As such, they may not be interpreted correctly by cyclists. Speed roundels with '15' are a more typical treatment for an advisory speed without legal implications.
5. The sharrows used in this design are neither in accordance with the TCD markings in terms of both their symbol and placement, or as per the intended and legal use for sharrows. Sharrows are used when traffic volumes and speeds are low, and space is constrained so it's safest for cyclists to ride in the centre of the lane.

Recommendation(s):

- 1 Zebra crossing bars should include limit lines and be proportioned similar to the new crossing bar widths.
- 2 Review current best practice and other kerb cutting treatments for cyclists around Wellington and reconsider design.
- 3 Design the ID-01 'Petone Station Overflow Carpark' sign in accordance with the TCD Manual.
- 4 Replace the PW25 '15' advisory speed pavement markings with '15' roundels.
- 5 Review use of sharrows and consider whether other types of markings are more appropriate.

Designers Response

- 1 *Zebra crossing bars should include limit lines and be proportioned similar to the new crossing bar widths.*
[Review and update accordingly \(two locations\)](#)
- 2 *Review current best practice and other kerb cutting treatments for cyclists around Wellington and reconsider design.*
[The location referred to is a connection for both pedestrians and cyclists to join or leave the shared path and services the WelTec access road and compensation car park. Retain the marking as shown for the SB approach. Remove the NB approach from Weltec \(low usage and any markings will conflict with the entry to the car park\).](#)
- 3 *Design the ID-01 'Petone Station Overflow Carpark' sign in accordance with the TCD Manual.*
[Review and amend if required](#)
- 4 *Replace the PW25 '15' advisory speed pavement markings with '15' roundels.*
[Review and amend if required](#)
- 5 *Review use of sharrows and consider whether other types of markings are more appropriate.*
[Review TCD and update if required](#)

Safety Engineer's Response

- 1 Agree
- 2 Agree with Designer's response

- 3 Agree with Designer's response
- 4 Speed limit roundel markings imply a speed limit. There is no speed limit here. We should not imply a regulatory situation that does not exist. If the speed advisory markings prove to be confusing, they should be supplemented with speed advisory signs.
- 5 Note: A Sharrow is a cycle marking with chevrons above it. A cycle marking with an arrow (as per this design) is not a Sharrow. It is acceptable. For more info on Sharrows, refer to <https://www.nzta.govt.nz/assets/resources/sharrow-markings-best-practice-guidance-note/Sharrow-markings-best-practice-guidance-note.pdf>

Client Decision: GR: As per Safety Engineer's response.

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

Signed: [Redacted] s 9(2)(a) Date: 2021-09-21
[Redacted] s 9(2)(a) BE (Civil) First Class Hons
Transportation Engineer, WSP

Signed: [Redacted] s 9(2)(a) Date: 2021-09-21
[Redacted] s 9(2)(a) (CPEng, CMEngNZ)
Principal Transportation Engineer, WSP

Designer: Name: [Redacted] s 9(2)(a) Position...20/10/21.....

Signature..... Date.....

Safety Engineer: Name: [Redacted] s 9(2)(a) Position...9/11/21.....

Signature..... Date.....

Project Manager: Name: [Redacted] s 9(2)(a) Position.....

Signature..... Date...10/11/21.....

Action Completed: Name..... Position.....

Signature..... Date.....

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

Date

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