



MWH

BUILDING A BETTER WORLD



POST CONSTRUCTION ROAD SAFETY AUDIT Island Bay Cycleway

Prepared for Wellington City Council

11 May 2016

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Wellington City Council

Island Bay Cycleway

Post Construction Road Safety Audit

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1 Introduction

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 users 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, which is a safe road system increasingly free 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 so 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);
- detail design stage (pre-implementation or implementation); and
- pre-opening or post-construction stage (implementation or post-implementation).

A road safety audit is not intended to be a technical or financial audit and does not substitute for a design check of 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 NZ Transport Agency (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 will 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. It is to be completed by the designer, safety engineer, and client for each issue, and should record the designer's response, client's 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

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

- Jon England, Senior Road Safety Engineer, MWH New Zealand Ltd
- Dhimantha Ranatunga, Transportation Engineer, MWH New Zealand Ltd

The Safety Audit Team (SAT) carried out a daytime site visit on the morning of Thursday 7 April 2016. The weather was fine and sunny. One member of the SAT carried out a night time site visit on Wednesday 6 April 2016. The route was cycled and driven in both the northbound and southbound directions during both daytime and night time site visits.

1.3 Report format

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

The expected crash frequency 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 speeds, type of collision, type of vehicle involved and vulnerability of the road user.

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.

1.3.1 Severity

Pedestrians and cyclists lack the typical protections which are provided by vehicles and consequently are more susceptible to impact speed causing death or serious injury. Figure 1-1 shows the survivability (likelihood of death) verse speed at impact and illustrates how various road users and collisions types have different crash outcomes as a result of impact speed. Pedestrians (as well as cyclists) have much lower survivability of crashes at or near urban speed limits. Additionally it should be noted that survivability does not depend on speed but impact which is also affected by vehicle mass, so high mass vehicles such as buses have lower survivability rates than shown below for a given impact speed.

Note that this scheme actively encourages cycle use; therefore the severity of a number of issues may be higher than would otherwise be the case.

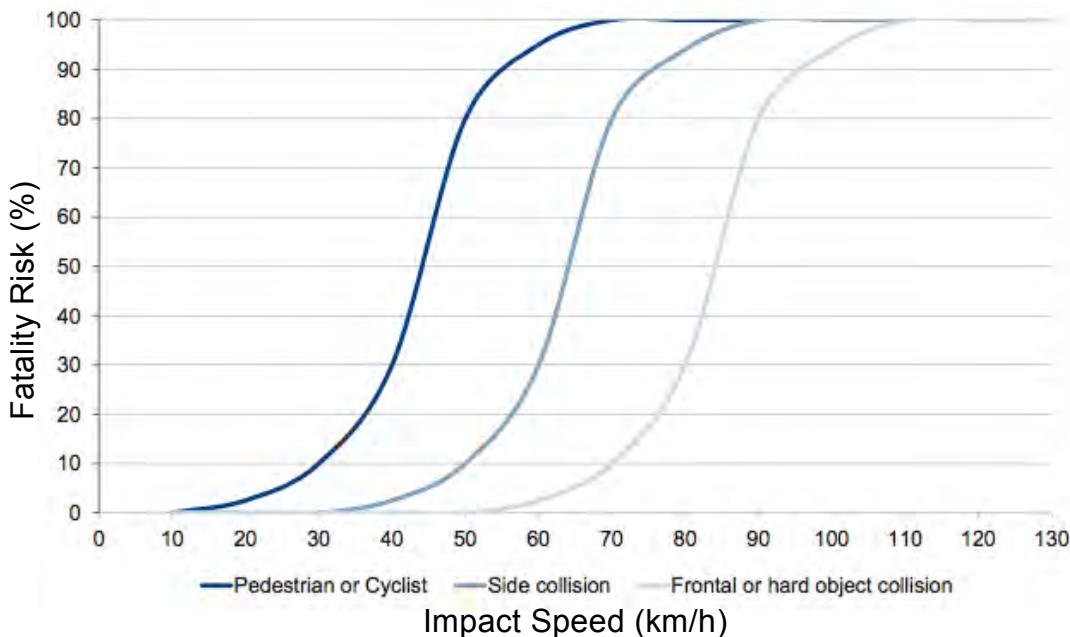


Figure 1-1: Crash Survivability¹

¹ http://www.audit.vic.gov.au/publications/2011-12/20110831-Road-Safety-Cameras/safety-camera-assets/figure_2c.png

1.3.2 Risk Matrix and 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 1-1. The qualitative assessment requires professional judgement and a wide range of experience in projects of all sizes and locations.

Table 1-1: 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 1-2.

Table 1-2: Concern categories

Concern	Suggested action
Serious	Major safety concern that must be addressed and requires changes to avoid serious safety consequences.
Significant	Significant safety concern that should be addressed and requires changes to avoid serious safety consequences.
Moderate	Moderate safety concern that should be addressed to improve safety.
Minor	Minor safety 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 Project description

This audited project comprises the full length of a walking, cycling, and public transport improvements project through a 1.7 km length of Island Bay on The Parade, from Dee St to Reef St.

The proposed signalised intersection improvements at The Parade and Dee Street have not been constructed; as a result, the northern extent of the audit is the southern side of the Dee Street intersection.

The improvements that have been implemented include the following;

- Northbound and southbound “Copenhagen” style cycle lanes located between footpath kerb and on-street parking from Reef Street to south of Medway Street and Avon Street to south of Dee Street on The Parade.
- Eight cycleway bus shelter bypasses on the footpath behind the bus shelters and one cycleway bypass of the pedestrian refuge south of Mersey Street.
- Additional pedestrian zebra crossings south of Humber Street, north of Mersey Street, just south of Tamar Street and south of Dee Street respectively.
- Pedestrian refuge islands south of Mersey Street crossing The Parade.
- “Sharrow” marking through the existing Island Bay village area 30 km/h speed zone between Medway Street and Avon Street to indicate a shared area for vehicles and cyclists to occupy the carriageway. The “sharrow” marking has been extended further south of Medway Street following the repositioning of the disabled parking spaces outside the Island Bay Medical Centre back to the kerb.
- Footpath kerb extension construction and removal at numerous side road intersections and midblock locations on The Parade.
- Formalising the existing individual car park spaces through provision of road marking.

Noting that:

- The proposed installation of safe-hit posts (or other devices) between the parking and cycleway has not been implemented, as WCC advised that parking compliance without them has been very good.

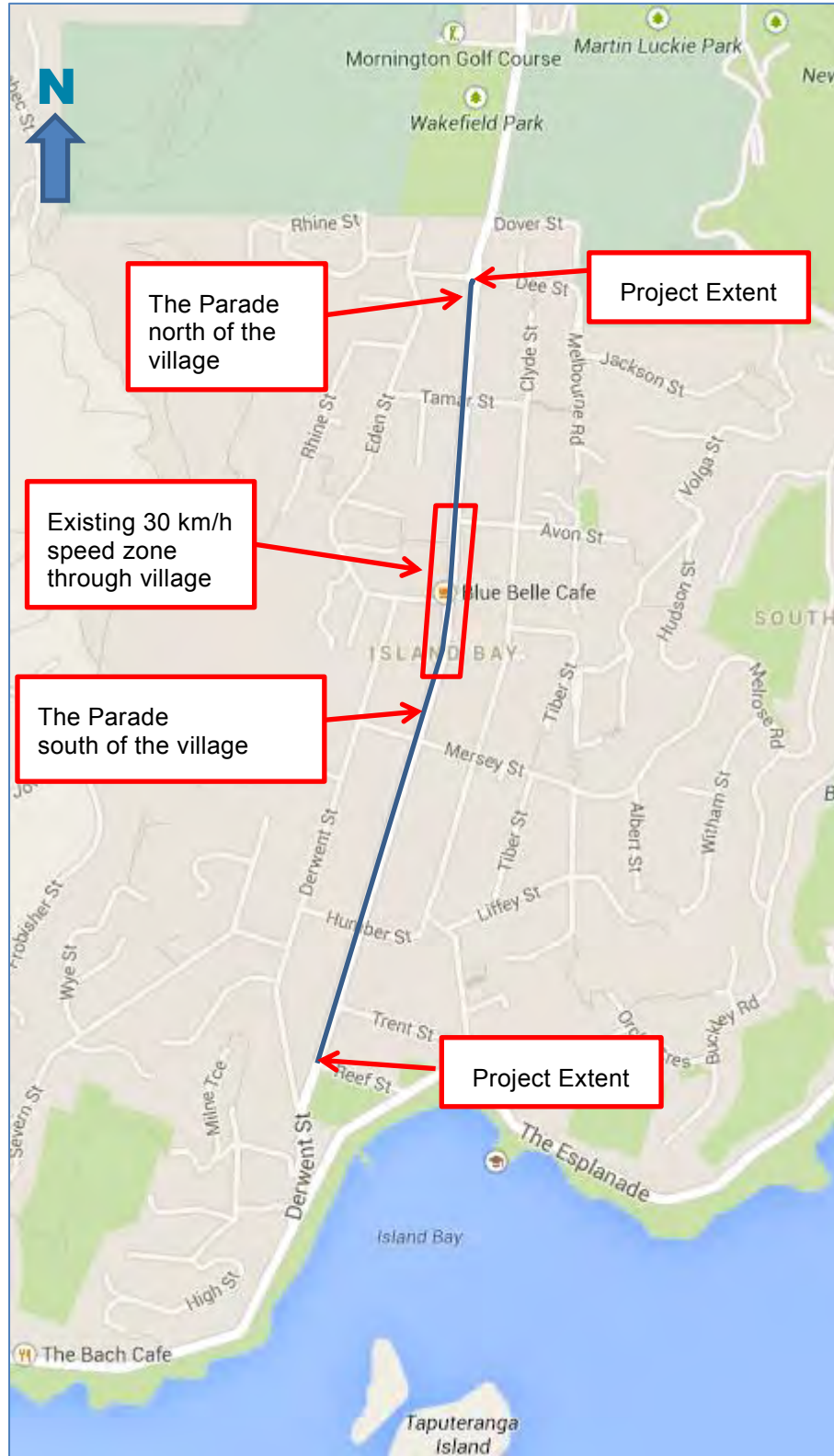


Figure 1-2: Project Location Plan

1.5 Scope of audit

This is a post construction safety audit of the proposed pedestrian, cycling, and public transport improvement works along The Parade, Island Bay between Reef Street and Dee Street. The proposed intersection improvements at The Parade and Dee Street were not constructed; as a result the northern extent of the audit is the southern side of the Dee Street intersection.

The SAT Team Leader was involved in the previous concept safety audit and the two detailed design safety audits (Stage 1 and Stage 2) on this project.

A concept stage audit report was completed on the project dated 19 September 2014.

There were two detailed design stage audits undertaken as the project was split into two stages. The Stage 1 (the section of project south of the village) audit report was completed dated 30 January 2015. The Stage 2 (the section of the project north of the village) audit report was completed on 19 March 2015.

1.6 Documents provided

The SAT was provided with the following documents for this audit which were stamped "Approved for Construction".

- Calibre Consulting; The Parade Upgrade, Island Bay; Phase 1; Drawings 1-C05 to 1-C13, Site Overlay, Signs and Markings (9 pages), dated between 9/10/15 and 11/11/2015
- Calibre Consulting; The Parade Upgrade, Island Bay; Phase 2; Drawings 20-C03 to 20-C04, Site Overlay, Signs and Markings (2 pages), 11/11/2015
- Calibre Consulting; The Parade Upgrade, Island Bay; Phase 1; Drawing 12-C01, Typical Details (1 page supplied of 5), 11/11/2015

1.7 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 or 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 organisation.

2 Safety Audit Findings

2.1 General Issues (Project Wide)

The following general safety concerns have been identified by the SAT relating to issues which occur throughout the project.

2.1.1 Ghost Markings

There are numerous locations throughout the project site where the previous markings have been blacked out using paint as opposed to other forms of removal. This causes confusion to the approaching motorist as it is not clear as to which markings are the correct markings as the blacked out markings can be clearly seen by approaching motorists (refer Figure 2-1 to Figure 2-4).

Figure 2-1 below shows that the right turn bay has been blacked out, but this is not immediately apparent from the approaching driver's perspective especially during the middle of the day when the sun shines along The Parade and at night with street light reflection off both the old and new road markings.



Figure 2-1: Photo showing ghost right turn bay markings



Figure 2-2: Photo showing an additional ghost right turn bay marking

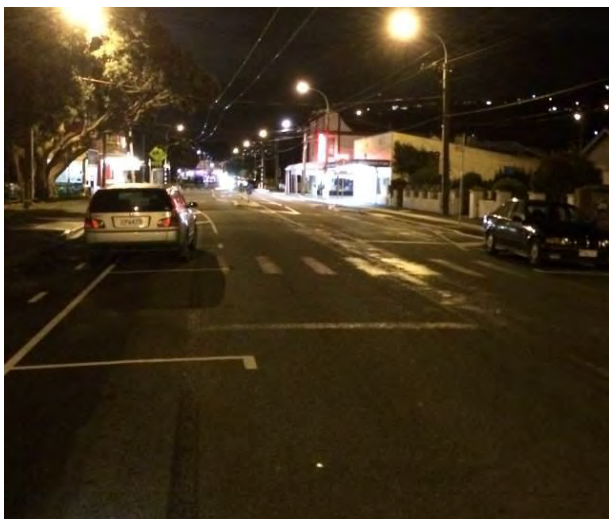


Figure 2-3: Photo showing former pedestrian zebra crossing markings



Figure 2-4: Photo showing removal of flush median markings, on a flushed surface, minimises centreline visibility

Recommendation

Remove redundant markings by a method that does not cause ghost marking such as a full width resurfacing.

Frequency	Severity	Rating
Crashes are likely to be Common	Death or serious injury is Likely	The safety concern is Significant
Designer response	The specification called for permanent removal of redundant markings. While it is acceptable to leave ghost markings in non-critical areas, permanent removal should be used to ensure unambiguous messages are given to road users in higher risk areas such as intersections.	
Safety engineer comment	N/A	
Client decision	Conflicting markings will be removed around intersections. Longitudinal markings will be left to wear away as blasting or blacking out has limited effectiveness on chip seal	
Action taken		

2.1.2 Extent of Green Cycleway Markings and Cycle Symbols

Green cycleway markings and cycle symbols are proposed at conflict areas between mode types. However, not all conflict areas and all hazard locations for cyclists have these markings provided (refer red circle in photos below). Intersection approach and departure chicanes should have this coloured surfacing to increase cyclists' awareness of the change in environment.

The SAT observed inconsistent application of both green coloured cycleway markings and cycle symbols along the bus stop cycle bypasses and across intersections, as shown in Figure 2-5 to Figure 2-8.



Figure 2-5: Photo showing a lack of green coloured cycleway markings on diverge from the "sharrow" lane into the cycleway



Figure 2-6: Photo showing green coloured cycleway markings provided on departure only. Note also the cycle symbol in advance of the green surfacing blending into the concrete surface

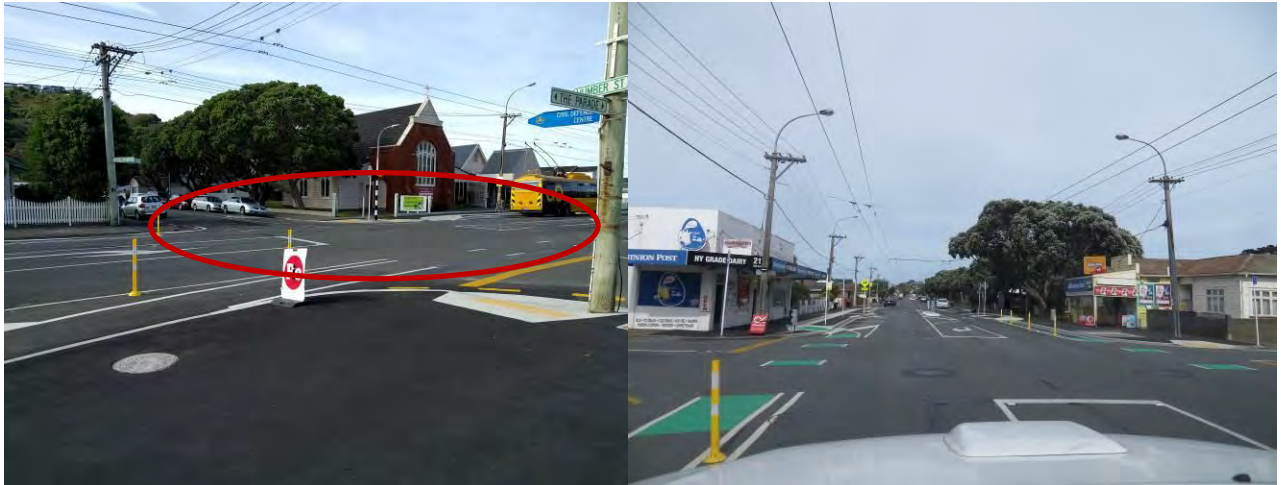


Figure 2-7: Photo showing a lack of green coloured surfacing and cycle symbols across the Humber St Intersection

Figure 2-8: Photo showing green coloured surfacing across the Mersey St intersection, however there are no cycle symbols provided

Recommendation

Ensure consistent application of green coloured cycleway markings and cycle symbols across the route, particularly at intersections and through both approach to and departure from the respective bus stop (and pedestrian refuge) bypasses.

Frequency		Severity	Rating
Crashes are likely to be Infrequent		Death or serious injury is Likely	The safety concern is Moderate
Designer response	Concur with safety audit.		
Safety engineer comment	N/A		
Client decision	The area shown in 2.5 is not a conflict area/safety issue, but using green to highlight the start of the bike lane is a good idea. Agree to install green as recommended by safety audit but cycle symbols will not be installed on all green markings as these will be used to raise awareness intimately throughout the route.		
Action taken			

2.1.3 Belisha Beacons at Pedestrian Crossings

The SAT noted during the night inspection that a number of Belisha beacons at pedestrian crossings along the route were not operational, refer Figure 2-9 and Figure 2-10 below. Belisha beacons provide additional dynamic advance warning to approaching motorists of the presence of a pedestrian zebra crossing. It is important to ensure that where Belisha beacons are provided that they are operational.

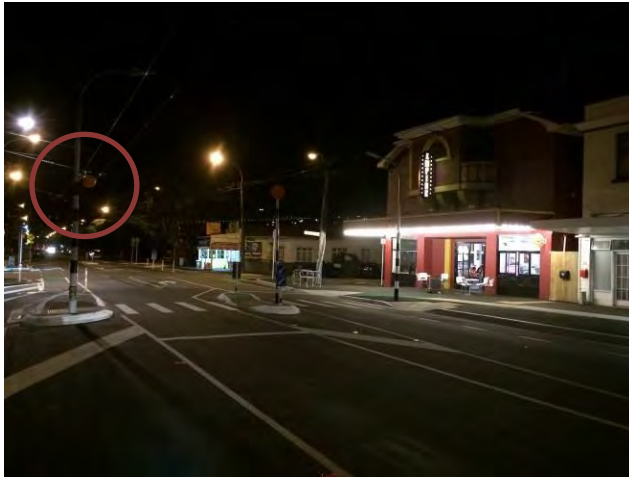


Figure 2-9: Photo showing the eastern Belisha beacon at the pedestrian zebra crossing opposite Empire Cinema was not operational

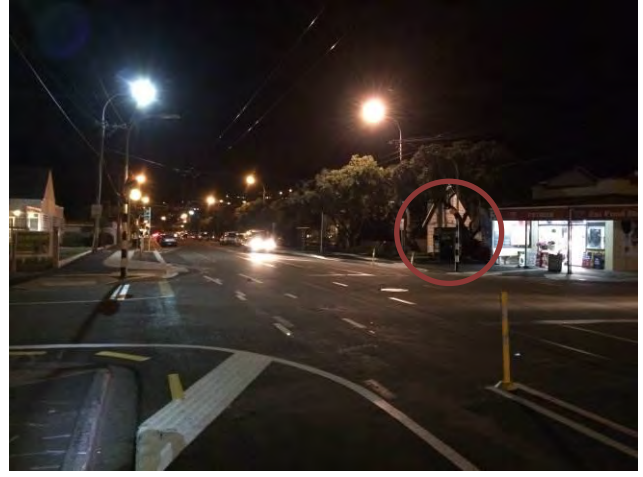


Figure 2-10: Photo showing that the western Belisha beacon at the intersection of Humber St was not operational

Recommendation:

Ensure that all Belisha beacons and floodlighting at pedestrian zebra crossings along the route are operational and replace or refresh (cleaning, change bulbs etc.) as required.

Frequency		Severity	Rating
Crashes are likely to be		Death or serious injury is	The safety concern is
Infrequent		Likely	Moderate
Designer response	Concur with safety audit.		
Safety engineer comment	N/A		
Client decision	Site checked 2 May 2016 – lights working. No further action required.		
Action taken	N/A		

2.1.4 Bus Shelter Intervisibility

The SAT observed that the bus stop cycleway bypasses generally operate well with regard to separating the high risk cyclist/vehicle conflict; however, a number of cyclist/pedestrian conflicts were noted due to poor intervisibility through the bus shelter, refer Figure 2-11 and Figure 2-12 below. Note that there are some bus shelters which incorporate advertising within their side walls thereby obstructing visibility through the bus shelter to the opposite side.

It was noted that the bus shelter north of Avon St had a clear side walls (refer to Figure 2-13 below), this increases inter-visibility between modes and reduces the potential for conflict.



Figure 2-11: Photo showing a pedestrian waiting on the cycleway bus stop bypass



Figure 2-12: Photo showing a cyclist swerving off the cycle lane to avoid a pedestrian



Figure 2-13: Photo showing a clear bus stop shelter, north of Avon St, providing good intervisibility between modes

Recommendation:

Provide clear sided bus shelters, where cycle bypasses are provided, as per the north of Avon Street bus stop shelter to increase intervisibility between modes.

Frequency	Severity	Rating
Crashes are likely to be Occasional	Death or serious injury is Unlikely	The safety concern is Minor
Designer response	Concur with safety audit. For cost reasons we chose to relocate an existing Adshel shelter near Mersey St. The risk of a pedestrian/cyclist conflict has been reduced by placing a rubbish bin so that an alighting bus passenger is encouraged to walk around it thereby increasing the sight distance to northbound cyclists. Northbound cyclists are encouraged to travel relatively slowly by the tight path width, it's ramped approach and relatively tight entry curves.	
Safety engineer comment	N/A	
Client decision	No further action required at present, pedestrians are directed away from the side of the shelter by the placement of the rubbish bin. We will consider changes if the issue is raised in annual safety review.	
Action taken		

2.1.5 Parking Bay Bollards

The installation of safe-hit posts (or other devices) between the parking and cycleway as proposed at the design stage has not been implemented, as WCC advised that parking compliance has been very good.

However, the SAT observed a number of vehicles parked well across the buffer zone, refer Figure 2-14 to Figure 2-17. Vehicles parked well across the buffer zone reduce the safety zone space increasing the risk of injuring a cyclist when passengers entering or exiting their vehicle open vehicle doors into the cycleway. Safe-hit posts (or other devices) installed on the corners of the respective parking bays aim to reinforce good parking behaviour to enable the safety zone space / buffer zone to be utilised by the open vehicle doors thereby minimising the likelihood of cyclist/vehicle door collision.



Figure 2-14: Photo showing a combination of vehicles parked across the buffer zone and on the footpath, limiting the width available to the cyclist



Figure 2-15: Photo showing a vehicle parked across the full width of the buffer zone



Figure 2-16: Photo showing a vehicle parked well across the buffer zone



Figure 2-17: Photo showing a number of vehicles parked partially across the buffer zone

Recommendation:

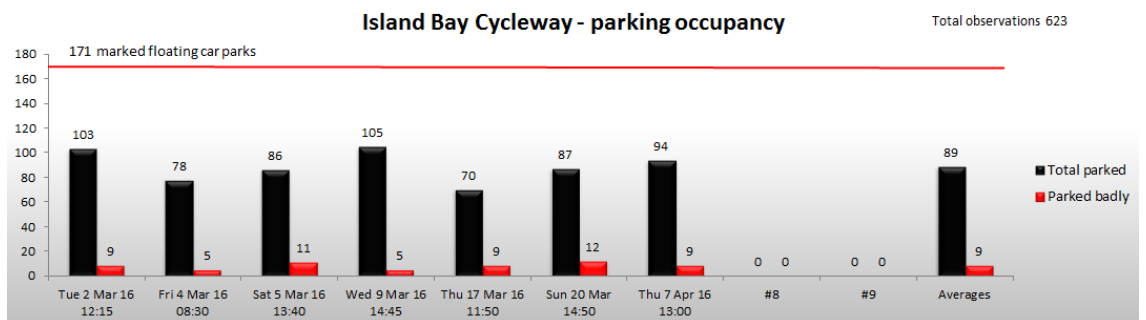
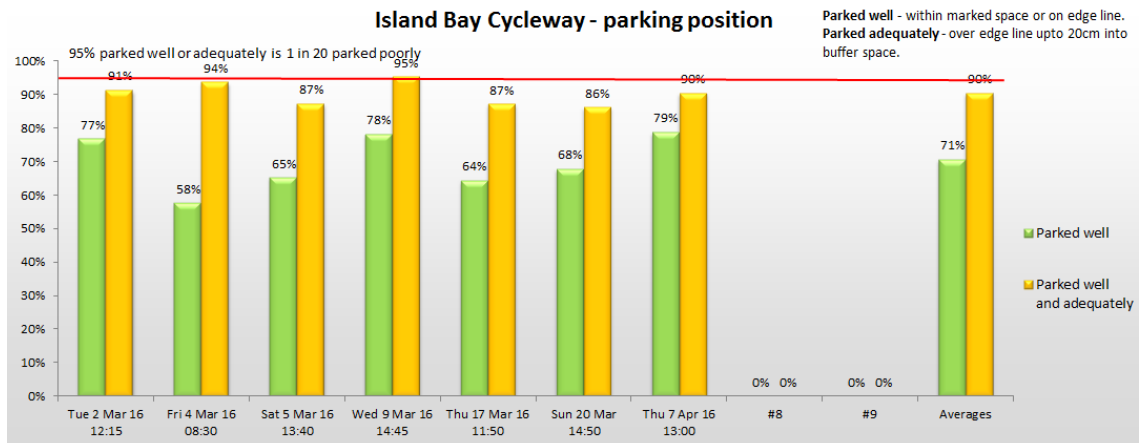
Provide appropriately delineated safe-hit posts (or other devices) at the corners of the individual parking spaces to increase parking compliance and reduce the likelihood of vehicle doors opening into the cycleway.

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

Designer response
 Concur with safety audit.

Safety engineer comment
 N/A

Client decision
 By 7 April 16 we had observed 623 parked vehicles over 7 surveys at various times and days of the week. The surveys showed 71% of vehicles were parked well and 90% parked well or adequately. Badly parked vehicles were observed to range from 5 to 12 with an average occurrence of 9.



To date there has been some education but little enforcement. We will instruct enforcement action to commence with a warning then infringement procedure. We will continue to monitor parking compliance and look to install safe hit posts if required.

Action taken

2.1.6 Cycle Friendly Sump grates

Kerbside sumps are traditionally a hazard for cyclists which can trap wheels in their longitudinal slots. As this is a known hazard to cyclists, cyclists will attempt to avoid riding over these sumps which could result in the cyclist swerving and crashing. This hazard can be mitigated by installing cycle friendly sump grates which have smaller shorter slots perpendicular to the approaching cyclists.

The SAT observed a non-cycle friendly sump at the intersection of Tamar St/The Parade. Although it is noted that this sump is offset from the cycle path, due to the proximity to the intersection, cyclists may prefer to be closer to the kerb, bringing the sump into play. In addition, debris build up at sumps along the project extent should be monitored and cleaned prior to encroaching into the cycleways.



Figure 2-18: Photo showing a non-cycle friendly sump at Tamar St/The Parade (inset photo: example of cycle friendly sumps elsewhere along the route).

Recommendations:

1. Ensure that all sump grates which are likely to have passing cyclist traffic are cycle friendly.
2. Ensure that appropriate maintenance programme is implemented to ensure that sump grates are regularly cleared of debris, particularly during the autumn period when leaves may end up in the drainage channel.

Frequency	Severity	Rating
Crashes are likely to be	Death or serious injury is	The safety concern is
Infrequent	Likely	Moderate
Designer response	Concur with safety audit.	
Safety engineer comment	N/A	
Client decision	Grates will be changed.	
Action taken		

2.1.7 Cycleway Directional Guidance

There are no arrows indicating direction of travel on the cycleway, although it is inferred by the direction of vehicular traffic and the side of the road the cycle path is on. The SAT observed cyclists travelling on the footpath in the opposite direction to the cycleway. There is also anecdotal evidence that some school children ride in both directions along the on-road cycle path. Cyclists travelling in the opposite direction to that intended may collide with other cyclists and result in mode conflict at pedestrian crossings, where pedestrians may fail to look in the opposite direction.

Consideration could be given to directional arrows at nominal intervals or placed on the approach/exit of intersections or bus stop bypasses, to reinforce that the cycleways are one-way.

Recommendation:

Provide directional arrows at nominal intervals along the cycleway as well as on the approach to and exit from both the intersections and the bus stop bypasses.

Frequency	Severity	Rating
Crashes are likely to be	Death or serious injury is	The safety concern is
Infrequent	Unlikely	Minor
Designer response	The provision of direction arrows is not covered in any guidance documents and is considered unnecessary. The orientation of the bike lane symbol and the lane position provide intuitive clues as to the appropriate direction for travel.	
Safety engineer comment	N/A	
Client decision	Agree with designer. We will address this if it comes up as an issue in annual safety reviews.	
Action taken		

2.1.8 Intervisibility sightlines at residential driveways

The presence of cars parked in close proximity to residential driveways can restrict the intervisibility sightlines between motorists entering and exiting these driveways and cyclists using the cycleway.

In some locations there is insufficient manoeuvring space to allow motorists to enter and exit these driveways without crossing into the opposing traffic lane to carry out their turning movement.

The SAT observed on site that a new residential driveway was being constructed at No. 84 The Parade directly opposite a marked parking space. The adjacent parking spaces upstream and downstream of this new driveway will need to be remarked appropriately in line with the guidance proposed in Figure 2-19 below.

It is recommended that a review of the marked parking spaces is undertaken along the route to ensure that appropriate spacing is provided either side of the driveways. This would provide both sufficient intervisibility between cyclists on the cycle lane and motorists entering and exiting driveways and appropriate manoeuvring space for motorists to carry out their turn movement without encroaching into the opposing traffic lane.

A recent paper from the *IPENZ Transportation Group Conference Auckland – March 2016*² proposed that a minimum 3m gap should be provided beyond the driveway (i.e. left hand side of driveways for exiting motorists). It was further proposed that the gap prior to the driveway (i.e. right hand side) varies between 3m to 8m depending on the number of vehicles parked prior to the driveway (refer to Figure 2-19 below).

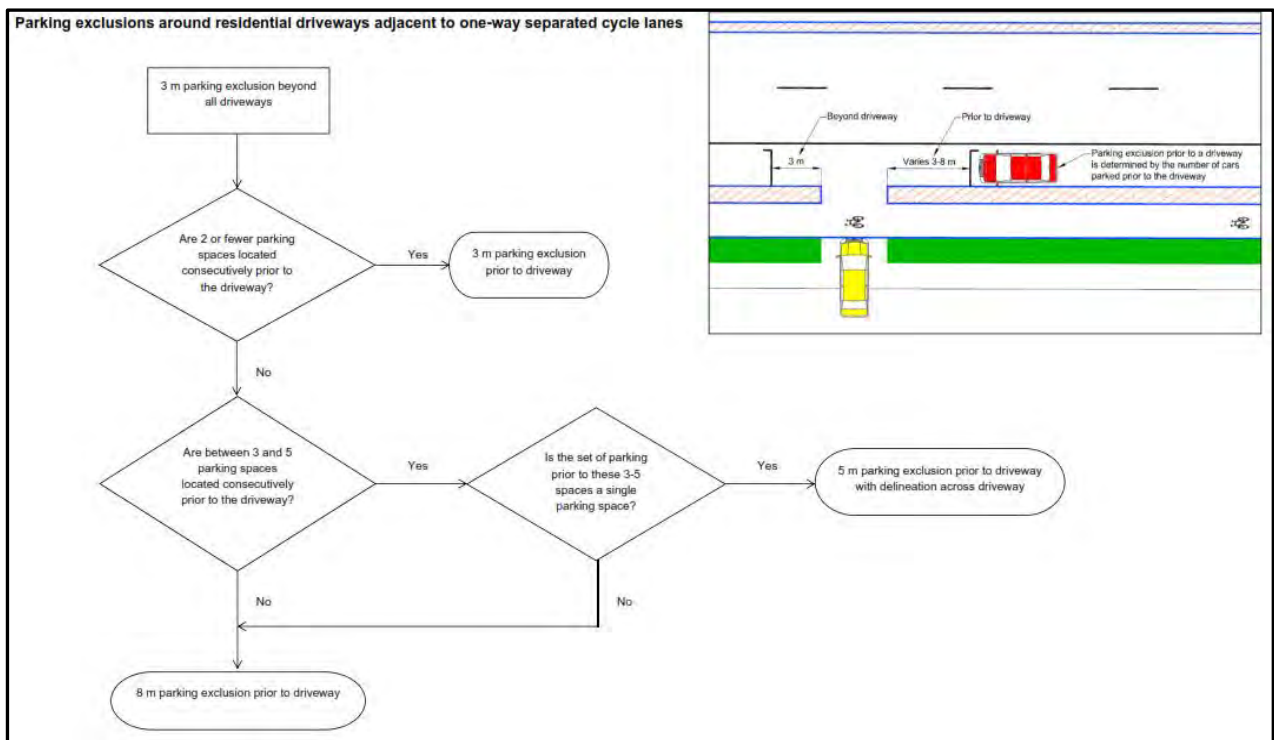


Figure 2-19: Diagram indicating recommended parking exclusions around residential driveways adjacent to one-way separated cycle lanes (Source: “Finding the Right Green Road for Cycle Routes” – IPENZ Transportation Group Conference Paper, Auckland - March 2016).

² Smith, M; Aldridge, D ; “Finding the Right Green Road for Cycle Routes” – IPENZ Transportation Group Conference Auckland - March 2016

Recommendation:

Review the marked parking spaces along the route to ensure that appropriate spacing is provided either side of the driveways in line with the suggested 3m space beyond each driveway and 3-8m prior to each driveway.

Frequency	Severity	Rating
Crashes are likely to be Occasional	Death or serious injury is Likely	The safety concern is Moderate
Designer response	The design minimised on-street parking loss by applying the legal minimum of 1.0m space between driveways and the start of a car park in accordance with the client's direction.	
Safety engineer comment	N/A	
Client decision	From enquiries received as a result of construction it is felt that there are approximately 12-15 residents that would benefit from adjusting the parking adjacent to their driveway. We will work with these residents to resolve their individual issues over driveway access/egress	
Action taken		

2.2 Specific Findings

The following safety concerns have been identified by the SAT relating to issues pertaining to particular sites within the project.

2.2.1 Pedestrian Crossing south of Humber Street

There is a partially built pedestrian crossing facility provided on The Parade on the southern side of the Humber St intersection (refer Figure 2-20 below). The pedestrian crossing has the black and white poles with associated Belisha beacon globes (note that only the eastern one is operational), and directional tactile/warning tactile pavers provided on both sides of the proposed crossing and the PW-30 Pedestrian Crossing signs have been installed. However, there are no zebra markings (bars or diamonds) provided, no refuge island and no advance warning diamond provided.

This sends mixed messages to both the pedestrian and approaching motorists. The SAT observed pedestrians utilising the pedestrian crossing even though there are no pedestrian zebra crossing markings provided on the carriageway (refer Figure 2-20 below). Motorists may not give way to pedestrians as they may not be perceived to be on a pedestrian crossing given the lack of zebra markings.



Figure 2-20: Photo showing the partially built pedestrian zebra crossing south of Humber St
Recommendations

This needs immediate action, noting that this issue and the ghost marking issue (Section 2.1.1) were raised with WCC via email the day after the audit (8 April 2016).

1. The zebra markings and the advance warning diamond pavement markings are painted immediately (i.e. within 24 hours), or
2. The pedestrian crossing is either barricaded off on both sides so it cannot be used/or the black and white poles and Belisha beacons covered up so that it can be used as a crossing point.
3. Following the provision of either item 1 or 2 above, the pedestrian crossing should be implemented as designed (i.e. incorporating a central island and associated tactile pavers).

Frequency	Severity	Rating
Crashes are likely to be Common	Death or serious injury is Very Likely	The safety concern is Serious
Designer response	Concur with safety audit. The provision of the new crossing's central island and markings has been delayed by unrelated drainage works. However, no interim traffic management has been provided.	
Safety engineer comment	N/A	
Client decision	We deliberately did not paint the zebra markings in because we are yet to complete the central island. This was not completed because Wellington Water are in the process of renewing a sewer main which connects into a manhole in the middle of this intersection. This work is imminent and to manage traffic around the site while this work is being carried out would not have been possible with the island. It is planned to install the zebra markings following completion of the island. The site is now under TMP for drainage works. Situation will be fixed as soon as possible once drainage works are complete	
Action taken		

2.2.2 Humber Street Intersection

The SAT observed that the safe-hit posts installed at the Humber Street intersections to protect cyclists from vehicles tracking across the cycleway when turning left out (Refer Figure 2-22), are also causing vehicles turning left out of the eastern side of Humber Street to track into the right turn bay (Refer Figure 2-21). The SAT observed a right turning vehicle not being able to use the right turn bay due to being obstructed by a vehicle turning left out of Humber Street onto The Parade. This right turning vehicle was forced to straddle the right turn bay and the southbound traffic lane to avoid the exiting vehicle.



Figure 2-21: Photo showing a vehicle turning left out of the western side of Humber St while another vehicle waits to turn right in



Figure 2-22: Photo showing the safe-hit posts installed at the western side of the Humber St intersection

Recommendation

Remove the intersection safe-hit posts on the north-western side of the Humber Street intersection to enable drivers exiting the western side of Humber Street to turn left into The Parade without tracking across the southbound right turn bay.

Frequency	Severity	Rating
Crashes are likely to be Occasional	Death or serious injury is Very Unlikely	The safety concern is Minor
Designer response	Relocate southern most post to ease left turn.	
Safety engineer comment	N/A	
Client decision	Post has been relocated since safety audit. No further action required.	
Action taken		

2.2.3 Northbound Cyclists entering the traffic flow from the left

The change to the disabled parking spaces on the eastern side of the road has been reflected on the western side of the road and the parking spaces have been shifted back to the kerb. This has resulted in the termination of the segregated cycleway and northbound cyclists now required to merge with the northbound traffic flow. The carriageway has been marked with “sharrow” markings to remind motorists of the likely presence of cyclists. However the location of the change from segregated cycleway and the repositioning of the parking bays back to the kerbside occurs just north of the left hand bend in The Parade. This can result in northbound cyclists appearing in the traffic flow from the left and they may surprise northbound motorists as the entering cyclists would be masked by parked vehicles.

Consideration should be given to providing an appropriate length of dedicated cycle lane with green surfacing which flares away from the kerb toward the northbound traffic lane thereby providing additional warning of the likely presence of cyclists to northbound motorists approaching the village.



Figure 2-23: View south along the northbound lane on The Parade towards the village. Note the lack of any guidance for cyclists (red circle above) or warning for motorists to expect the presence of cyclists entering the traffic flow.

Recommendation

Provide a designated green surfaced cycle lane for northbound cyclists to utilise as they approach the shared space “sharrow” area so that northbound motorists are aware of the presence of cyclists entering from their left into the traffic flow.

Frequency		Severity	Rating
Crashes are likely to be Occasional		Death or serious injury is Likely	The safety concern is Moderate
Designer response	Concur with safety audit.		
Safety engineer comment	N/A		
Client decision	Green shared area markings were installed since safety audit. No further action required.		
Action taken			

2.2.4 School Signage located South of Mersey Street

The SAT observed that on the southern approach to the Mersey Street intersection, the school sign combination (PW-32) is obscuring the pedestrian crossing sign (PW-30). This was noted as being an issue from both the cycleway and the traffic lane (where the PW-30 is partially obscured – refer photo

below right). The pedestrian crossing sign is one part of the information disseminated to a road user in advance of a pedestrian zebra crossing therefore it is important that this is not obstructed.



Figure 2-24: View northbound on cycleway approach to the bypass of the pedestrian refuge island. Note the overlapping school and pedestrian crossing signage south of Mersey Street.



Figure 2-25: View northbound on The Parade approach to the pedestrian refuge island. Note the partially overlapping of the pedestrian crossing signage by the school sign

Recommendation

Relocate the school sign (PW 32) located south of Mersey Street further south along The Parade so it does not overlap with the pedestrian crossing warning sign.

Frequency	Severity	Rating
Crashes are likely to be Infrequent	Death or serious injury is Unlikely	The safety concern is Minor
Designer response	The signs have been located in the best positions that are available. No further action is recommended.	
Safety engineer comment	N/A	
Client decision	Instructions will be issued to change the PW Children signs to smaller signs on lower poles, and to be orientated toward the footpaths as opposed to approaching drivers.	
Action taken		

2.2.5 Directional Tactile Paving at Pedestrian Crossing south of Dee Street

Directional tactile pavers direct visually impaired footpath users towards crossing facilities and public amenities. The SAT observed a lack of directional tactile pavers on the eastern side of the pedestrian zebra crossing located south of Dee Street and due to the width of the footpath, these may be beneficial for visually impaired footpath users at this location, thereby differentiating it from the bus access point located to the south.



Figure 2-26: Photo showing missing directional tactile pavers on the eastern side of the pedestrian zebra crossing located south of Dee Street.

Recommendation

Provide directional tactile pavers on the eastern side of The Parade to assist visually impaired pedestrians to navigate to the pedestrian zebra crossing located south of Dee Street.

Frequency	Severity	Rating
Crashes are likely to be Infrequent	Death or serious injury is Likely	The safety concern is Moderate
Designer response	The RTS 14 Guideline recommends a minimum length for direction tiles of 1m. As the site length is less than 1m, they are not required.	
Safety engineer comment	N/A	
Client decision	Agree with designer.	
Action taken		

2.2.6 Pedestrian Refuge Central Island located south of Mersey Street

The SAT observed missing tactile pavers at the central island of the pedestrian refuge crossing point (refer Figure 2-27), this may result in visually impaired pedestrians failing to stop at the central island and continuing to cross The Parade, with the potential for vehicle conflict. These were included on the construction drawings but were not installed at the time of the audit site visit.

In addition, the SAT noted that the central kerb build out is sitting outside of the road markings and into the northbound traffic lane (refer Figure 2-27 inset photo). Scuff marks on the kerb confirm this hazard has previously been hit.

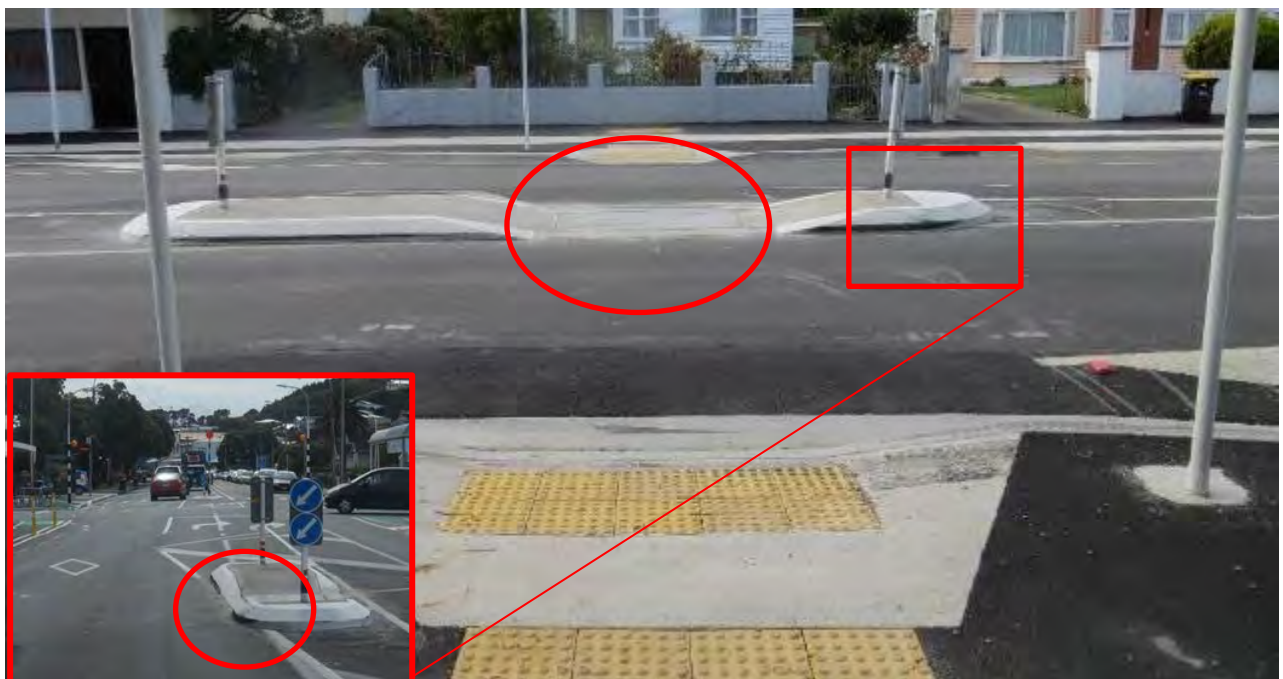


Figure 2-27: Photo showing missing tactile pavers at the central island of the refuge crossing south of Mersey St (inset photo: showing the kerb build out sitting outside of the markings)

Recommendations

1. Install tactile pavers at the central pedestrian refuge island located south of Mersey Street.
2. Cut back the kerb on the southern central refuge island south of Mersey Street so that it is contained wholly within the painted median.

Frequency	Severity	Rating
Crashes are likely to be Occasional	Death or serious injury is Likely	The safety concern is Moderate
Designer response	The RTS 14 Guideline recommends no tactile pavers be installed in islands less than 1.2m wide. As this site is narrower, no further action is necessary. There is a need to alter the road markings (see 2-27) to ensure the island is appropriately delineated.	
Safety engineer comment	N/A	
Client decision	Agree with designer.	
Action taken		

2.2.7 Pedestrian Zebra Crossing located north of Mersey Street

The SAT observed a white pole adjacent to the eastern side of the pedestrian zebra crossing located north of Mersey Street, refer Figure 2-28. There is a pedestrian crossing located between the kerb and the adjacent island which is missing a PW-65 sign and pole. This pole needs to be replaced with a PW-65 incorporating a Belisha Beacon Disk and black and white pole markings which should have been implemented according to the construction drawings provided. The purpose of the Belisha Beacon Disk and markings, at this location, is to provide advance warning to cyclists for the upcoming pedestrian crossing, where cyclists are required to give way to pedestrians.



Figure 2-28: Photo showing a pole without a Belisha Beacon Disk or black and white markings on the pedestrian zebra crossing (eastern side) located north of Mersey Street.

Recommendation

Install a PW-65 Belisha Beacon Disk and black and white markings on the pole on the eastern side of the pedestrian zebra crossing located north of Mersey Street.

Frequency	Severity	Rating
Crashes are likely to be Occasional	Death or serious injury is Unlikely	The safety concern is Minor
Designer response	Concur with safety audit.	
Safety engineer comment	N/A	
Client decision	Instructions will be issued to rectify the fault.	
Action taken		

2.2.8 Disabled Parking Spaces and Fire Hydrant outside the Medical Centre

In this location, the design drawings indicated the cycleway located adjacent to the kerb and the disabled parking spaces located outside the cycleway and buffer zone as elsewhere on this project. Following public feedback after construction, these disabled parking spaces were relocated to the kerbside and cyclists required to share the traffic lane.

The SAT noted that, following the recent modification to the disabled parking spaces, the fire hydrant is now located within the southern disabled park (rather than just in the buffer area, as previously). There is also no designated area for disabled parking space users to access the footpath and its associated drop kerb from the existing yellow buffer area.

There is a likelihood of vehicles parking over the fire hydrant in its current layout. Therefore, consideration should be given to the repositioning of the southern parking space to avoid the fire hydrant. This would enable the accommodation of a yellow hatched access area of appropriate width (refer to red circled area in photo below) between the respective parking spaces to provide a link between the footpath and the existing yellow buffer area for disabled parking space users.



Figure 2-29: Photo showing the length of the southern disabled parking space (note the vehicle parked at the southern end of the space) and the fire hydrant located between the two parking spaces (currently located inside the southern disabled parking space), south of Medway Street

Recommendation:

Provide an appropriately wide yellow hatched area between the two disabled parking spaces to provide access to and from the footpath and the existing yellow hatched area that also incorporates the existing fire hydrant.

Frequency	Severity	Rating
Crashes are likely to be Infrequent	Death or serious injury is Unlikely	The safety concern is Minor
Designer response	The fire hydrant is not a road safety issue, but agree we should hatch the area around it to the channel.	
Safety engineer comment	N/A	
Client decision	Instruction will be issued to install hatching.	
Action taken		

2.3 Comments

The following comments are either of a general nature or cannot be related to any specific safety concern, but are included here for consideration by the designers and the client as they may contribute to improving overall road safety.

2.3.1 Bend south of Medway St

The bend in The Parade south of Medway St, combined with parking on both sides of the road and the speed cushions, results in a constrained road environment for heavy vehicles, including buses.

The SAT observed two buses attempting to negotiate the bend simultaneously, which resulted in one bus stopping and waiting until the other had passed.



Figure 2-30: Photo showing the constrained road environment south of Mersey St

Consideration should be given to a review of the bus/heavy vehicle tracking curves on the bend south of Medway St.

Comment	
Designer response	It is accepted that the installed layout in this location is a little too tight. However, while inconvenient it is not unsafe as it is within the 30km/h zone and drivers' have very good visibility of any conflict so can take appropriate action (slowing or stopping as required). Recommend continue to monitor.
Safety engineer comment	N/A
Client decision	Agree with designer.
Action taken	

2.3.2 Consistency of Yellow No-parking Line Marking

The SAT observed inconsistencies in the application of yellow no-parking line markings across driveways, refer Figure 2-31 and Figure 2-32. In lieu of no-parking markings, motorists may inadvertently attempt to manoeuvre into the space, creating unnecessary potential for conflict and delays with the through traffic. This is exacerbated by the removal of the flush median markings, which would have provided additional manoeuvring width for through traffic.



Figure 2-31: Photo showing no-parking line marking between parking spaces, north of Mersey St



Figure 2-32: Photo showing a lack of no-parking line marking between larger parking spaces

Consideration should be given to applying consistent yellow no-parking line marking between parking bays where driveways are present.

Comment

Designer response Concur with safety audit.

Safety engineer comment N/A

Client decision This is not necessarily a safety issue but rather a convenience issue over illegal parking. The safety aspect of driveway access is dealt with under 2.1.8. We will work with residents as required to address any issue around inconsiderate parking.

Action taken

2.3.3 Mersey St Bus Stop Bypass

The SAT noted that the placement of the bins by the nearby residents in the vicinity of the Mersey St bus stop bypass, restricts the section of shared space and forces pedestrians into the cycleway section of the bus stop bypass.



Figure 2-33: Photo showing bins obstructing the shared space at the Mersey St bus stop bypass

It is recommended that the owner of the dwelling is encouraged to place the bins closer to the kerb to avoid unnecessarily obstructing the footpath.

Comment

Designer response The inconsiderate placement of rubbish and recycling bins is not a matter that can be addressed by the project.

Safety engineer comment

Client decision Agree with designer.

Action taken

3 Audit statement

We declare that we remain independent of the design team, and have not been influenced in any way by any party during this road safety audit.


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.

We have noted the safety concerns that have been evident in this audit, and have made recommendations that may be used to assist in improving safety.

Signed  Date 11 May 2016

.....

Jon England, BE Civil MIPENZ CPEng Int.PE(NZ) RPEQ PMP
Senior Road Safety Engineer, MWH New Zealand, Wellington, New Zealand

Signed  Date 11 May 2016

.....

Dhimantha Ranatunga, BE (Hons) Civil GIPENZ
Transportation Engineer, MWH New Zealand, Wellington, New Zealand

4 Response and decision statements

System designers and the people who use the roads must all share responsibility for creating a road system where crash forces do not result in death or serious injury.

4.1 Designer's responses

I have studied and considered the auditors' safety concerns and recommendations for safety improvements set out in this road safety audit report and I have responded accordingly to each safety concern with the most appropriate and practical solutions and actions that are to be considered further by the safety engineer and project manager.



Signed

Date 16 May 2016

Designer: Joe Hewitt
Cycling Principal Engineer, Wellington City Council

4.2 Safety engineer's comments (if applicable)

I have studied and considered the auditors' safety concerns and recommendations for safety improvements set out in this road safety audit report together with the designer's responses. Where appropriate, I have added comments to be taken into consideration by the project manager when deciding on the action to be taken.

Signed N/A

Date

Safety engineer's name, qualifications
position, company

4.3 Project manager's decisions

I have studied and considered the auditors' safety concerns and recommendations for safety improvements set out in this road safety audit report, together with the designer's responses and the comments of the safety engineer, and having been guided by the auditor's ranking of concerns have decided the most appropriate and practical action to be taken to address each of the safety concerns.

Signed

Date 17 June 2016

Project manager: Paul Barker
Planning Manager, Network Improvements, Wellington City Council

4.4 Designer's statement

I certify that the project manager's decisions and directions for action to be taken to improve safety for each of the safety concerns have been carried out.

Signed

Date

Designer's member name, qualifications
position, company

4.5 Safety audit close out

The project manager is to distribute the audit report incorporating the decisions to the designer, safety audit team leader, safety engineer, and project file.

Date: