



MWH

BUILDING A BETTER WORLD



POST CONSTRUCTION ROAD SAFETY AUDIT
Central Motorway Junction Cycleway
AECOM Component

Prepared for NZTA

10 March 2015



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NZTA

Central Motorway Junction Cycleway - AECOM Section

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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 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); or
- 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 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:

- s 9(2)(a) Technical Development Leader – Transportation, MWH New Zealand, Auckland
- s 9(2)(a) Principal Transportation Engineer, MWH New Zealand, Auckland
- s 9(2)(a) Transportation Team Leader, MWH New Zealand, Auckland

The safety audit team (SAT) conducted the safety audit on site on Thursday afternoon 19 February 2015 and revisited the site once it was dark to assess the safety of the route at night.

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, 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 1-1. 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 audit reviews of the recently constructed off-road cycleway in Grafton Gully between the Ian McKinnon Drive intersection with Upper Queen Street and the Churchill Street intersection with Beach Road. A full plan of the cycleway showing all project stages is attached as Appendix A.

The cycleway runs in close proximity to SH1 and SH16 through the central motorway junction area.

This audit covers the following sections:

- Ian McKinnon Drive Intersection
- Upper Queen Street (Ian McKinnon Drive to Canada Street)
- Upper Queen Street Intersection with Canada Street
- Stage 3a and 3b (Upper Queen Street to Wellesley Street Underpass)
- Bridge Connection to University (near Wellesley Street)
- Stage 4 (Wellesley Street to Grafton Road)
- Grafton Road Intersection
- Stage 1 (Grafton Road to Alten Road)
- Stage 2 - Churchill Street (Alten Road to Beach Road)

At NZTA's request the Alten Road Intersection with SH16 (Stanley Street) was specifically excluded from this audit

The project is for the provision of a cycle facility, however it is likely that it will also attract significant pedestrian use.

This audit report presents just those concerns that relate to the design work completed by AECOM. As such not all the issues raised on the above sections are contained herein.

1.5 Scope of audit

This is a post construction safety audit of the new 1.9km long cycleway and its connections. The SAT is not aware of any incomplete construction items.

1.6 Previous road safety audits

ViaStrada Ltd conducted several road safety audits of the scheme and detail design over preceding years. MWH (Nick Gluyas) was an audit team member on all preceding ViaStrada audits and for consistency, was retained to lead this audit.

The SAT has generally not reconsidered previous safety issues that had been resolved prior to construction.

1.7 Documents provided

The SAT had access to all previous road safety audits and attachments.

1.8 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 are they 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.

2 Safety Concerns – Stage 3a and 3b (Upper Queen Street to Wellesley Street Underpass)

2.1 Encroachment of vegetation

The grass vegetation planted immediately adjacent to the cycleway has grown significantly over summer months and now encroaches across into the cycleway by at least 0.5m on either side. Given the type of grass (slightly abrasive) it is not particularly pleasant to brush past and subsequently cyclists were observed to be avoiding and shying away from it. This has the effect of reducing the cycleway down to approximately 2 m in width and increases the risk of crashes between passing path users.



Figure 1: Grass encroaching over the cycleway path

Recommendation

Ensure the grass vegetation immediately adjacent to the path is trimmed regularly to stop encroachment and when appropriate (e.g. when the background vegetation has matured) remove the grass or replace it with a more appropriate species.

Frequency	Severity	Rating
Crashes are likely to be occasional	Death or serious injury is unlikely	The safety concern is minor
Designer response	NZTA (AT) maintenance should be able to manage vegetation growth by regular cutbacks to edge of path. This would resolve the safety concern.	
Safety engineer comment	Accept Designers Response (ADR)	
Client decision	NZTA to perform grass trimming until the end of defects liability period, i.e. September 2015 and then project will be handover to Auckland Transport for maintenance.	
Action taken	Grass trimming executed in the month of June 2015	

2.2 Through visibility

Further to 2.1 above, the SAT noted a potential forward visibility issue under the Symonds Street onramp. Northbound cyclists approaching this section (potentially at speed) will tend to shy towards the centre of the path to avoid brushing the vegetation. The same vegetation, together with the shade under the onramp, conspires to hide visibility to southbound path users heading up the hill. The grade of the path at this location (11%) also lengthens the stopping distance for down-hill cyclists. These factors combine to increase the chance of a crash between a downhill cyclist and an uphill path user.



Figure 2: Encroaching grass obscures sight distance and narrows the path

Recommendation

Consider installing some form of signage and/or markings immediately south (uphill) from the Symonds Street onramp underpass highlighting the need to keep left and moderate approach speed.

Frequency	Severity	Rating
Crashes are likely to be occasional	Death or serious injury is unlikely	The safety concern is minor
Designer response	NZTA (AT) maintenance should be able to manage vegetation growth by regular cutbacks to edge of path. This action would resolve the safety concern.	
Safety engineer comment	ADR	
Client decision	NZTA to perform grass trimming until the end of defects liability period, i.e. September 2015 and then project will be handover to Auckland Transport for maintenance.	
Action taken	Grass trimming executed in the month of June 2015	

2.3 Motorway interface

At the Symonds Street motorway onramp connection with the southern motorway the shared path descends from a level above the motorway lanes to travel underneath the onramp. At this location the nearest lane of the southern motorway is no more than 2 m away (at head height). The SAT was concerned that any debris (accidental or deliberate) from a passing vehicle would enter the shared path area at roughly head height, posing a significant hazard to a passing cyclist or pedestrian. This hazard is further exacerbated given the low non-solid side barrier at this location. The SAT was also concerned that the current barrier would not comply with NZTA's current requirements for side road protection and may not contain a heavy vehicle impact.

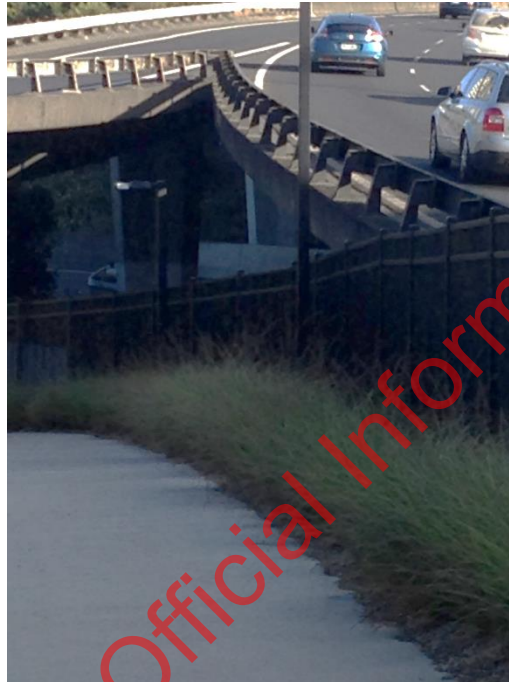


Figure 3: Note close proximity of motorway, potentially non-compliant barrier system and potential for fallen objects to strike path users

Recommendations

1. Review whether the motorway side barrier is fit for purpose
2. Provide a screen to stop debris falling (or thrown) from motorway traffic from entering the shared path area

Frequency	Severity	Rating
Crashes are likely to be infrequent	Death or serious injury is likely	The safety concern is moderate
Designer response	<ol style="list-style-type: none"> 1. Motorway side barrier is not in project scope. This concern should be referred to AMA for consideration to upgrade the bridge and edge protection. 2. This issue has been raised before in previous RSA's and the risk is no different to debris falling off a truck further down the cycleway where it is located alongside the motorway or street (eg. Beach Rd section). 	
Safety engineer comment	ADR. This issue will be considered in an area wide investigation of barrier fitness.	
Client decision	Investigate the two SAR recommendations above	
Action taken	AMA to take care of recommendation 1; the screen to catch debris falling to cyclists	

Frequency	Severity	Rating
Crashes are likely to be infrequent	Death or serious injury is likely	The safety concern is moderate

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2.4 Exposed retaining wall poles

The tops of the steel 'H' pile retaining wall are exposed such that that a glancing collision with the wall could result in part of a cyclists body catching on the corners of the retaining posts. The likelihood of a crash is further increased due to the close proximity of the wall to the path (no separation zone), the local narrowing of the path (less than 2.5m) and the lack of a 'rub' rail on the retaining wall side.

The after-market hard rubber covers that have been attached to the top of the H-piles would offer no protection for the type of crash illustrated in Figure 4.



Figure 4: Exposed 'H' pile posts are a hazard for glancing collisions with the retaining wall

Recommendation

Encapsulate the top of the retaining wall (including the posts) in a capping beam such that any glancing blow will slide along the wall and not catch on the exposed corners of the retaining wall posts

Frequency	Severity	Rating
Crashes are likely to be infrequent	Death or serious injury is likely	The safety concern is moderate

Designer response

Agree this could happen but highly unlikely. A cyclist hitting the wall by a glancing blow would more likely be thrown away from the wall and not into it at the angle shown in the photograph. However a plastic half round pipe capping could be installed. A rub rail would reduce the already narrow width causing a problem for cyclists approaching from the opposite direction. NZTA to advise if want to proceed with a specialised treatment.

Further, if this safety concern is treated then it would then be prudent to protect cyclists hitting the many crib walls along this route. An additional expense that the design team did not consider warranted

Safety engineer comment

ADR. The risk of this type of incident is very low.

Client decision

Accept Safety Engineer's recommendation

Action taken

No further action to be taken

Frequency	Severity	Rating
Crashes are likely to be infrequent	Death or serious injury is likely	The safety concern is moderate

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3 Safety Concerns – Stage 1 (Grafton Road to Alten Road)

3.1 Streetlights not working

During the night inspection the SAT noted that half the streetlights on Stage 1 were not working (9 lights). On previous site visits to this stage this has also been the case, whereas the lighting on all other stages was 100% operational. Poor lighting is a possible risk to personal security and increases the chance of crashes between path users.

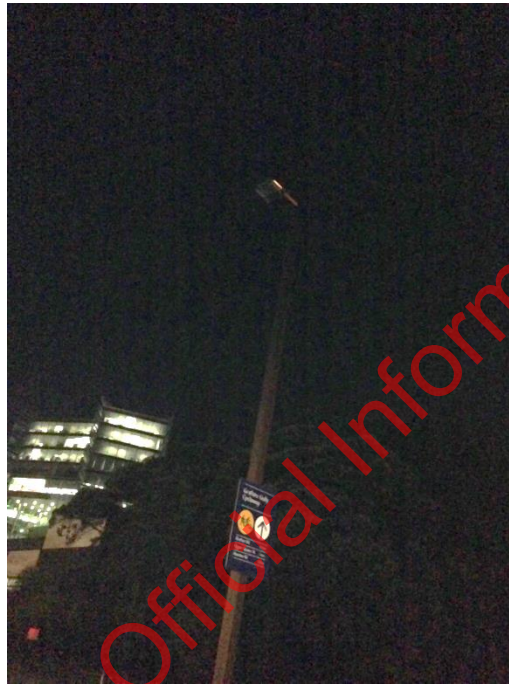


Figure 5: Streetlight not working

Recommendation

Undertake a thorough maintenance check of the lighting in Stage 1.

Frequency	Severity	Rating
Crashes are likely to be infrequent	Death or serious injury is unlikely	The safety concern is minor
Designer response	NZTA (AT) maintenance need to raise this fault with Vector Ltd as the supplier of power to the AT street lighting or advise Council Action line of the fault to resolve this issue. All lights were working at the time of handover from the Contractor and at end of defects period.	
Safety engineer comment	ADR. This is a maintenance issue.	
Client decision	NZTA to inform AT of the lighting maintenance issue which is now their responsibility	
Action taken	AT has taken responsibility of the lighting maintenance. No further action to be taken.	

4 Safety Concerns – Stage 2 - Churchill Street (Alten Road to Beach Road)

4.1 Ambiguous priority

Near the Alten Road end of Stage 2 the shared path crosses Churchill Street on a raised speed table. As the raised speed table does not include zebra markings drivers of vehicles on the road have right of way. However, the shared path at this location does not have any signage or markings indicating cyclists should dismount or give way to vehicles. The SAT consider that the red colour of the table and the lack of any obvious indicators suggesting cyclists should give way (e.g. chicanes, signage, markings, hold rails, etc.) increases the risk of a cyclist crashing with a vehicle, especially given the low volume of vehicles using Churchill Street and the propensity for cyclists to grow accustomed to not having to give way.



Figure 6: Mid-block crossing across Churchill Street

Recommendation

Clarify whether vehicles or cyclists should have right of way at the Churchill Street speed table and mark, sign and control crossing movements appropriately

Frequency	Severity	Rating
Crashes are likely to be infrequent	Death or serious injury is likely	The safety concern is moderate
Designer response	The safety concern raised has been answered in above auditor discussion ie. <i>the shared path at this location does not have any signage or markings indicating cyclists should dismount or give way to vehicles.</i> Cyclists in this instance do not have right of way and given the speed table hence low vehicle speeds and low vehicle frequency this is not considered to be a moderate concern. Further to this sight lines are more than adequate at this location.	
Safety engineer comment	ADR. This is not a moderate risk.	
Client decision	Accepts Safety Engineer's recommendation.	

Frequency	Severity	Rating
Crashes are likely to be infrequent	Death or serious injury is likely	The safety concern is moderate

Action taken No further action required

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5 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 10 March 2015

s 9(2)(a) CPEng, MIPENZ, BSc(Eng), BEng(Hons), MSc
Principal Transportation Engineer, MWH New Zealand Ltd

Signed 

Date 10 March 2015

s 9(2)(a) CPEng, MIPENZ, BE(Civil)(Hons), Road Safety Engineering Workshop (2000)
Technical Development Leader, MWH New Zealand Ltd

Signed 

Date 10 March 2015

s 9(2)(a) BE(Civil)(Hons), BSc Physics, GIPENZ, Road Safety Engineering Workshop (2005)
Auckland Transportation Team Leader, MWH New Zealand Ltd

6 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.

6.1 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, which are to be considered further by the safety engineer (if applicable) and project manager.

Signed _____

Date _____

Designer's name, qualifications
position, company

6.2 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 _____

Date 13/05/15

Safety engineer's name, qualifications
position, company

6.3 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 (if applicable), 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 _____

Project manager's name, qualifications
position, company

6.4 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

6.5 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:

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