

Pa Road - Kerikeri Footpath

Road Safety Audit
Post-Construction
September 2021



 **NCC**
consulting engineers

**NORTHLAND
TRANSPORTATION
ALLIANCE** 

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NCC - Consulting Engineers

David Spoonley, CEng, CIHT, MICE, BEng (Hons)
 20A Commerce Street
 PO Box 472, Whangarei 0140
 Phone 09 438 3345
 Fax 09 438 3375
 E-mail: dave@ncceng.co.nz

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Document Status

Rev No.	Project No.	Author	Reviewer		Approved for Issue		
			Name	Signature	Name	Signature	Date
A		David Spoonley	Mike Sullivan		David Spoonley		16 Sept 2021
B							
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1. Introductory statement

1.1. Introduction

This report presents the findings of a post-construction safety audit for a new footpath on Pa Road, Kerikeri between the intersection of Kerikeri Inlet Road and the point where the Te Araroa Trail leaves Pa Road.

The works aim to improve pedestrian safety.

The project design was developed by Haigh Workman for the Northland Transportation Alliance.

1.2. Brief description of the proposed works

The works comprise of a footpath on Pa Road between the intersection of Kerikeri Inlet Road and the point where the Te Araroa Trail leaves Pa Road.

1.3. Road environment

Pa Road serves as a secondary collector connecting Kerikeri Inlet Road with a small residential area.

Traffic volumes using Pa Road are estimated to be 578 AADT (2020), as measured by the Mobile Roads website. Heavy Commercial Vehicles is estimated at 10%.

1.4. Audit team

The audit team comprised of:

David Spoonley (Team Leader)	BEng, CEng, CIHT MICE Project Manager / Road Safety Engineer NCC – Consulting Engineers, Whangarei
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Mike Sullivan	BE (Civil), CMEngNZ Director Engineering Equilibrium, Whangarei
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1.5. Previous audit

A design stage safety audit was carried out on this project in October 2020.

1.6. Audit methodology

This audit has been carried out for James Obamila, Project Manager, Northland Transportation Alliance.

The audit follows the guidelines contained within the NZ Transport Agency document “Road Safety Audit Procedures for Projects, Guidelines, Interim Release, May 2013” and is complemented by the auditors’ experience with other audits.

This audit should not be regarded as a complete “quality check” of the project. It focuses essentially on safety issues that are considered significant in regard to the constructed works.

The auditors have identified road safety concerns and have made recommendations about corrective actions. Whilst these recommendations may indicate the nature or direction of a solution, they do not provide specific details of how to address or resolve that concern.

Responsibility for the solution of any safety issue identified in this audit remains with the designer.

1.7. Project documentation

The drawings listed in **Figure 1** were supplied for the detailed design stage audit. These are included in **Appendix A**.

Index	
P30	Location Plan
P31	Site Location Plan
P32	Site Location Plan
P33	Site Location Plan
P34	Site Location Plan
LS	Footpath (Timber Pole) Long Section
DE30	Detail Plan
DE31	Typical Cross Section Timber Pole Retaining
DE32	Typical Timber Wall Detail
DE33	NZS 4404:2010 CM-001
DE34	NZS 4404:2010 CM-002
DE35	Handrail Detail

Figure 1: Drawings provided for audit.

1.8. Briefing meeting

No briefing meeting was held for this audit.

1.9. Site visit

The audit team visited the site on 14 September 2021, weather conditions were showery.

1.10. Crash History

NZTA's Crash Analysis System (CAS) for the period 2016-2020 indicates one non-injury crash on Pa Road. In this crash a vehicle drifted off the road and collided with a power pole.

1.11. Ranking system

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

The probable crash frequency is qualitatively assessed based on expected exposure (how many road users will be exposed to a safety issue) and the probability of a crash resulting from the presence of the issue. The likely severity of a crash outcome is qualitatively assessed based on factors such as expected speeds, type of collision, and type of users 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 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: Assessment matrix

Likelihood of Fatality or Serious Injury	Probability of a Crash Occurring			
	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: Categories of concern

CONCERN	Suggested action
Serious	Serious 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 the 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 the auditors may give suggestions.

1.12. Decision tracking process

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.

1.13. 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 audit team. However, it must be recognised that eliminating safety concerns cannot be guaranteed since no road can be regarded as absolutely safe and no warranty is implied that all safety issues have been identified in this report. 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 organisations.

1.14. Project Chainages

The project chainages referred to in this report are RAMM displacements obtained from the Mobile Roads website. The datum for these chainages is the intersection of Pa Road and Kerikeri Inlet Road.

2. Safety audit findings and recommendations

2.1. Design Stage Safety Audit Recommendations

The recommendations of the detailed design stage safety audit, and actions, are summarised in **Table 1**. These have been checked for completion, as noted in the table and the associated photographs.

Reference	Issue	Audit recommendation	Comments
2.1	Footpath Location Ch 0 – 110.	1. Relocate the footpath to the east side of Pa Road.	The footpath was relocated to the eastern side of Pa Road, refer to Figure 2 .
		2. Reduce the radius turning into Pa Road.	This recommendation was referred to the Safety/Asset Team for inclusion in the LTP.
		3. Provide a Pedestrian Island 'throat island' at the intersection of Pa Road and Kerikeri Inlet Road of a type shown below.	This recommendation was referred to the Safety/Asset Team for inclusion in the LTP.
2.2	Curve Ch 400.	1. Consider providing a guardrail at this location to prevent errant vehicles from landing on the footpath located below the road level.	The client decision was not to provide a guardrail.
		2. Remove fence and relocate to road boundary to enable a suitable setback (berm) to be placed between back of guardrail and proposed footpath.	The client decision agreed with this recommendation and the fence was relocated, refer to Figure 3 .
2.3	Driveway, Ch 290	In consultation with the landowner consider removing the end tree nearest the footpath to minimise the number of these seed heads landing on the footpath.	This recommendation was not accepted by the client.
2.4	Culvert, Ch 475	Extend the culvert down the rear of the retaining wall and under the footpath in order that the water passes under the footpath.	This recommendation was accepted, and appropriate drainage installed.

Reference	Issue	Audit recommendation	Comments
2.5	Tree Stumps, Ch 550.	Remove stumps. Straighten the footpath alignment to avoid bringing it closer to the sealed carriageway.	Some of these stumps have been removed and the footpath realigned, refer to Figure 4 .
2.6	Curve, Ch 650 – 700.	Consider pipe culverting approximately 50m of roadside water table to remove short lengths of steep open roadside drain and remove the necessity for a handrail.	This recommendation was not accepted by the client. Refer to Figure 5 for the post-construction situation.
2.7	Culvert adjacent to crossing point, Ch 780.	Consider extending the culverting of the water table to the adjacent driveway.	The client decision was that this recommendation was out of the scope of this project.

Table 1: Items from the detailed design stage safety audit (October 2020).



Figure 2: The new footpath has been located to the east side of Pa Road.



Figure 3: The relocated fenceline at Ch400.



Figure 4 : Stumps partially removed and footpath realigned at Ch550.



Figure 5 : As-constructed footpath at Ch700.

Recommendations

Noted for the record.

2.2. Accessways Ch 140

On the eastern side of Pa Road at Ch 140 are three accessways relatively close together. Between the accessways the watertable is open and presents a significant hazard to either errant vehicles, vehicles turning into the accessways or users of the footpath, refer to **Figure 6**. Particularly in case of users of the footpath, if a user were to fall off the edge of the footpath, injury could result.



Figure 6: Hazards between three accessways Ch140.

Recommendations

Pipe the watertable in the two short gaps and fill between these 3 accessways.

Overall Rating: Minor

Frequency Rating: Occasional

Severity Rating: Very Unlikely

Designer Response: Table 2 categorises Minor as '*Minor concerns that should be addressed where practicable to improve safety*'. Pa Road is zoned Rural Living under the District Plan. Open roadside drains are a feature of the rural roading network. The risk to errant vehicles entering an open roadside drain given the 50 kph speed limit is not considered warranted.

Designer's recommendation: No action required.

Safety Engineer: Agree with SAT, disagree with Designer. As per District Plan this area is recognised as Residential. Given that 50 km/h and a footpath also verify the urban context of this street it means that urban design principles, not Rural, should be applied. It means that open roadside drains should be avoided wherever it is possible. Given that existing gaps are short it will not be expensive to apply appropriate treatment that was suggested by SAT team. Therefore it is highly recommended to address the raised minor safety issue.

Client Decision: Agree with Safety Engineer's comments however, there is no budget to allocate to this project within 2021-24 LTP and this work will need to be included in the 2025-27 LTP unless surplus funds become available by Council.

Action Taken: No action taken at this stage, until further directive is provided by the asset team

2.3. Watertable crossing Ch 360

The curvature of the footpath at this location is severe, far more severe than was indicated on the design drawings, refer to **Figure 7**. A footpath user, particularly a wheeled user may drop off the footpath as they pass through this area.

In addition, there is a significant ($\approx 0.5\text{m}$) drop immediately off the edge of the footpath. Should a user wander off the edge of the footpath, they will fall into a rubble lined watertable, possibly resulting in injury. Typically, level safety zones are provided at the edges of paths to mitigate this risk. A width of 0.5 is considered appropriate for the environment.

The design drawings indicated a handrail was to be installed in this area 'if fall greater than 1m as directed by the engineer'.



Figure 7 : Watertable Ch 360; extract of design drawing (upper) and as constructed footpath (lower) showing the location of steep drops at the edge of the footpath.

Recommendations

Either

1. Reconstruct this area to provide an alignment closer to that indicated on the design drawings and provide a level safety zone within 0.5m of the footpath edge.

Overall Rating: Minor

Frequency Rating: Occasional

Severity Rating: Unlikely

Designer Response: Table 2 categorises Minor as 'Minor concerns that should be addressed where practicable to improve safety'. Providing a level safety zone within 0.5m of the footpath edge is not practicable given the proximity to the open roadside drain. A practicable solution might be to install a short length of handrail on roadside only. This would provide guidance and assistance to those less able. However, given the rural zoning and open roadside drains, the risk posed by a minor drop-off (\approx 0.5 m) off is considered acceptable.

Designer's recommendation: No action required.

Safety Engineer: Agree with SAT. Totally disagree with an approach chosen by Designers. Rural Zone principles are not applicable in this case. Therefore, designer's comments are irrelevant.

Client Decision: Agree with Safety Engineer's comments however, there is no budget to allocate to this project within 2021-24 LTP and this work will need to be included in the 2025-27 LTP unless surplus funds become available by Council.

Action Taken: No action taken at this stage, until further directive is provided by the asset team.

Or

2. Provide handrails at locations where users may fall off the side of the footpath and injure themselves.

Overall Rating: Minor

Frequency Rating: Occasional

Severity Rating: Unlikely

Designer Response: Same argument as per 1. above.

Designer's recommendation: No action required.

Safety Engineer: Agree with SAT. Totally disagree with an approach chosen by Designers.

Client Decision: Agree with Safety Engineer's comments however, there is no budget to allocate to this project within 2021-24 LTP and this work will need to be included in the 2025-27 LTP unless surplus funds become available by Council.

Action Taken: No action taken at this stage, until further directive is provided by the asset team.

2.4. Curve Ch 400

This curve, particularly with the footpath below the road on the outside of the curve, has been the subject of a petition from footpath users concerned that they are vulnerable should a vehicle lose control on this curve.

This issue was considered during the design stage safety audit and two possible options were recommended, these being;

1. Consider providing a guardrail at this location to prevent errant vehicles from landing on the footpath located below the road level,
2. Remove fence and relocate to road boundary to enable a suitable setback (berm) to be placed between back of guardrail and proposed footpath.

The latter of the two was accepted and implemented (refer to **Figures 8 and 9**), the designer's response to the former stated *'the probability of an errant vehicle occurring is infrequent, this combined with the very unlikely chance of a pedestrian being on the path at the same point gives a minor risk rating using the Table 1 assessment matrix'*

The Safety Engineer agreed with the above appraisal and the Client Decision was not to provide a guardrail.

The post construction audit team have further considered this matter and concur with the designer's risk appraisal above. The audit team notes the relatively low traffic volume on Pa Road (AADT363), the low vehicle speeds (speed environment \approx 50km/h) and the low crash history (1 non-injury crash in 5 years).

There is, however, a residual risk that such an incident could occur, albeit very infrequently. This risk could be further reduced by providing appropriate delineation on this curve.

Recommendation

Provide appropriate delineation on this curve.

Overall Rating: Moderate

Frequency Rating: Infrequent

Severity Rating: Likely

Designer Response: The petitioners' perception is of a heightened level of danger presented by the difference in level between the carriageway and footpath. However, even for a footpath at grade, the consequence of an errant vehicle contacting a pedestrian would remain high.

We agree with the audit response which is considered appropriate given the rural roading environment, *'This risk could be further reduced by providing appropriate delineation on this curve'*.

Designer's recommendation: Install reflective roadside edge markers NZTA M14 by Sreka Industries or similar approved. Spacing as per Guidelines for Rural Road Marking and Delineation RTS 5.

Horizontal spacing of posts on outside of LH curve shall be 50 m.

Posts shall be placed vertically so that the top of the post is 900 mm above the adjacent edge of the

traffic lane. Posts not further than 3 m from the side of the adjacent traffic lane. Where no shoulders exist a lateral clearance of at least 1.2 m to the adjacent traffic lane shall be provided where practicable.

Safety Engineer: Agree with SAT and the treatment proposed by Designer.

Client Decision: Agree with Safety Engineer's comments. Works to be carried out under the Southern Maintenance & Renewals Contract, liaise with the Maintenance Team Lead and Network Supervisor to programme the installation of EMP's as budget allows.

Action Taken: Advised maintenance team to raise a dispatch for installation of EMPs and programme accordingly.



Figure 8 : Footpath at curve at Ch400.



Figure 9 : Footpath at curve at Ch400.

2.5. Steep slope sign Ch 550

This sign has been erected to warn footpath users of a 13% downhill gradient, the gradient is relatively short. However, the sign erected is a full-size road sign and to approaching drivers it looks like it relates to road users (refer to **Figure 10**). This is potentially confusing as the road immediately following the road sign ascends a gradient. Given that the sign is potentially confusing to road users and the downhill gradient on the footpath is relatively short it should be removed.



Figure 10 : Downhill gradient sign Ch 550.

Recommendation

Remove this sign.

Overall Rating: Comment

Frequency Rating: -

Severity Rating: -

Designer Response: Agree with the audit response.

The purpose of the sign was to warn of an anticipated steep gradient at the top end of the hill. Then sign should be at the top of the gradient not the bottom. Same as would apply for a fall from height, place sign at the top not foot of fall. Since the safety audit did not identify a steep gradient at the top end of the hill, we suggest removing the sign all together.

Designer's recommendation: remove sign

Safety Engineer: Agree with SAT and Designer's recommendation.

Client Decision: Agree with Safety Engineer's comments. Works to be carried out under the Southern Maintenance & Renewals Contract, liaise with the Maintenance Team Lead and Network Supervisor to programme the removal of this sign.

Action Taken: Advised Maintenance team to raise a dispatch for removal of signs and programme work appropriately.

2.6. Edge of footpath

Throughout the project there are examples of there being step drops ($\approx 0.5 - 1.0\text{m}$ in height) immediately off the side of the footpath. In these circumstances should a user slip or accidentally wander off the footpath this could possibly result in falling and injury. **Figure 11** indicates examples of these steep drops.

Typically, level safety zones are provided at the edges of paths to mitigate this risk. A width of 0.5 is considered appropriate for the environment.



Figure 11 : Examples of steep drop offs off the edge of the footpath.

Recommendation

Provide a level safety zone within 0.5m of the footpath edge.

Overall Rating: Minor

Frequency Rating: Occasional

Severity Rating: Unlikely

Designer Response: Same comments as per Item 2.3

Designer's recommendation: No action required.

Safety Engineer: Agree with SAT, disagree with Designer. A level safety zone within at least 0.5 meters is highly recommended.

Client Decision: Agree with Safety Engineer's comments however, there is no budget to allocate to this project within 2021-24 LTP and this work will need to be included in the 2025-27 LTP unless surplus funds become available by Council.

Action Taken: No further action taken until further directive is provided by the asset team.

3. Audit Statement

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

Signed: ... 

Date: 16/09/2021

David Spoonley BEng, CEng, CIHT MICE
Project Manager / Road Safety Engineer NCC – Consulting Engineers, Whangarei

Signed: 

Mike Sullivan, BE (Civil), CMEngNZ
Director, Engineering Equilibrium, Whangarei

Date: 16/09/2021

Designer:

Name: Tom Adcock Position: Senior Civil Engineer ..

Signature: 

Date: 21/09/2021

Safety Engineer:

Name: Elizabeth Stacey

Position: Road Safety Engineer

Signature: 

Date: ... 23/11/2021

Client:

Name: Cushla JORDAN

Position: Asset Manager

Signature: 

Date: 23rd November 2021

Action Completed:

Name: .James Obamila

Position: Project Manager

Signature: 

Date: 29 November 2021

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



Appendices

Appendix A: Design Drawings

Appendix A: Design Drawings



20A Commerce Street, Whangarei 0110
PO Box 472, Whangarei 0140
Ph 09 438 3345
admin@ncceng.co.nz

www.ncceng.co.nz