BEFORE INDEPENDENT HEARINGS COMMISSIONERS

UNDER	of the Resource Management Act 1991 (RMA)
IN THE MATTER	notices of requirement under section 168 of the RMA for the construction, operation, maintenance and improvement of approximately 11.5km of new State Highway between Ashhurst and Woodville.
BY	**NZ TRANSPORT AGENCY** Requiring Authority

EVIDENCE OF MARK AARON READ
ON BEHALF OF PALMERSTON NORTH CITY COUNCIL

15 March 2019

Simpson Grierson
Barristers & Solicitors

M G Conway / K Viskovic
Telephone: +64-4-924 3430
Facsimile: +64-4-472 6986
Email: matt.conway@simpsongrierson.com / katherine.viskovic@simpsongrierson.com
DX SX11174
P O Box 2402
Wellington

TABLE OF CONTENTS

1. QUALIFICATIONS AND EXPERIENCE

1.1 My full name is Mark Aaron Read.

1.2 I am an Infrastructure & Projects Engineer at Palmerston North City Council (**PNCC**) and I have held this position since 2017. My qualifications are Bachelor of Civil Engineering from Auckland University.

1.3 I have six years' experience as a Transportation Engineer. This has predominantly been in transport planning, transport assessments, investment decision making and delivery of transportation projects. I have worked for the NZ Transport Agency (**NZTA**), Beca engineering consultants and PNCC.

1.4 I have prepared transportation assessments for resource consent applications and plan changes on behalf of Wellington City Council and PNCC. I have undertaken transport safety assessments in the business case and design phases of projects. In 2016 I undertook the Safe System Engineering Workshop, which is a practitioners training for the Safe System approach. It provides the knowledge and introduces the skills to undertake a wide range of road safety work including road safety audits.

1.5 In preparing this evidence I have reviewed the following:

(a) Te Ahu a Turanga: Manawatu Tararua Highway Project: Technical Assessment #1 Transport;

(b) Te Ahu a Turanga: Manawatu Tararua Highway Project: Assessment of Effects on the Environment: Appendix 3. Road Design Philosophy Statement;

(c) Manawatu Gorge Alternatives Detailed Business Case;

(d) Manawatu Gorge Alternatives Detailed Business Case: Appendix N Road Safety Audit;

(e) Section 42A Technical Evidence: Traffic and Transport;

(f) New Zealand Transport Agency Evidence: 1. Evidence of Sarah Downs – Portfolio Manager System Design Developing Regions;

(g) New Zealand Transport Agency Evidence: 2. Evidence of Jonathan Kennett – Walking and Cycling;

(h) New Zealand Transport Agency Evidence: 6. Evidence of David Dunlop – Transport;

(i) PNCC Evidence of Shane Vuletich - economics; and

(j) PNCC Evidence of David Murphy - planning.

1.6 I am authorised by PNCC to present evidence on its behalf.

1.7 I have read the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note 2014 and have complied with it in preparing this evidence. I confirm that the issues addressed in this evidence are within my area of expertise and I have not omitted material facts known to me that might alter or detract from my evidence.

1.8 The key documents that I have referred to in preparing my evidence include:

(a) Safer Journeys 2010-2020;

(b) Safer Journey Action Plan 2016-2020;

(c) Safer Journeys for People who Cycle;

(d) One Network Road Classification (**ONRC**) Performance Measures (A General Guide);

(e) ONRC Fit for Purpose Customer Levels of Services (**CLoS**) Outcomes (Provisional);

(f) Austroads Guide to Road Design Part 3: Geometric Design;

(g) Transport Agency Technical Memorandum TM-2503 Guidelines for Edge Protection and Medians on Dual Carriageway Roads, incorporating a Safe System Philosophy;

(h) Transport Agency Specification for Design, Construction and Maintenance of Cycling and Shared Path Facilities.

2. SCOPE OF EVIDENCE

2.1 My evidence will address the following matters:

(a) Best practice provision of walking and cycling facilities for the Project route;

(b) A response to the section 42A reports and NZTA evidence that is relevant to the PNCC submission and the scope of my evidence.

2.2 My evidence focuses on walking and cycling. It does not consider all transport and road safety aspects of the NOR.

3. SUMMARY OF EVIDENCE

3.1 Safer Journeys, the ONRC, and best practice road design all support use of the Safe System approach when considering vulnerable road users, including cyclists, for high-speed, dual carriageway roads such as the Project.

3.2 The Safe System approach looks beyond the road user and examines the entire road system to improve safety. Figures in **Appendix A** demonstrate the fatality risk for vulnerable road users involved in a crash with a vehicle travelling at speeds between 80km/h and 100km/h is extremely high. The Safe System approach recommends separating vulnerable road users from these high-speed vehicles to avoid any potential collision as these are likely to result in a death or serious injury.

3.3 The Saddle Road and Pahiatua Track are proposed by the Transport Agency as two alternative routes for cyclists once the Project is open.

3.4 The Saddle Road and Pahiatua Track are unforgiving roads for cyclists. In places these roads have limited forward visibility, narrow shoulders and potentially high-speed traffic adjacent. Given these roads deficiencies, any mistake made by a cyclist or other vehicle is exacerbated, meaning there is a higher risk of an accident, and a higher risk that any accident will result in a fatal or serious injury. I do not consider these roads to be safe cycling routes.

3.5 There is apparent agreement that the Project route will attract cyclists. I consider that the Project route will be an attractive option for cyclists compared to the Saddle Road or Pahiatua Track. An appropriate facility that meets the Safe System approach for cyclists and other vulnerable road users should be provided.

3.6 In my view, in order to meet the Safe System approach, a separated facility should be provided for vulnerable road users as part of the Project.

3.7 Based on Austroads guidance, the recommended path for walkers and cyclists is 3.0m in width with a minimum 0.5m clearance to any fixed hazards. In my view, this design standard should be followed.

3.8 I disagree that the Transport Agency's proposed shoulder width of 2m for the Project is adequate for cyclists or meets recommended best practice. Should a separated facility not be provided, the sealed shoulder width should be increased to comply with recommended best practice.

3.9 I consider recommended best practice shoulder width where cyclists are expected to ride and there is a speed limit of 100km/h is 3.5m plus a 0.2-0.5 clearance to any side barrier or structure.

4. USE OF FACILITIES FOR CYCLING

4.1 Once the Project is complete, there will be three roads traversing the Tararua and Ruahine ranges in the vicinity of the Manawatu / Palmerston North area. The new Project route, the Saddle Road and the Pahiatua Track. Cyclists will be able to legally use all three routes. This section considers the selection of these routes by cyclists once the Project is complete.

Saddle Road & Pahiatua Track

4.2 The NOR Transport Technical Assessment summarised the two alternative routes currently in use, i.e. the Saddle Road and Pahiatua Track (paragraphs 54-64).

4.3 The Saddle Road was noted to have a steep curvilinear alignment with one lane in each direction, with sporadic slow vehicle passing opportunities. The severity of the terrain traversed by Saddle road results in poor efficiency and safety outcomes. The route climbs approximately 300m vertically.

4.4 The Pahiatua Track (Pahiatua Aokautere Road) was noted to have a narrow curvilinear alignment with one lane in each direction and limited passing opportunities. The route climbs approximately 350m vertically.

4.5 Sealed shoulder widths for both the Saddle Road and Pahiatua Track are predominantly between 0m and 0.5m. Both routes have discrete sections which provide a wider sealed shoulder width. These are mostly on the Saddle Road where there has been a greater level of investment since the previous Manawatu Gorge closure in 2011/12.

4.6 **Appendix B** includes an extract from the *Safer Journeys for People Who Cycle* document published in December 2014. The figure demonstrates that the lack of shoulder width results in a greater risk to cyclists.

4.7 I consider the Saddle Road to have a tortuous alignment. Due to the vertical and horizontal alignment of the route, forward sight distances for vehicles around curves are often restricted. There is a shorter section of the Pahiatua Track where similar issues occur.

4.8 Saddle Road currently has a speed limit of 60km/h. It is not certain this speed limit will remain over some or all of the route after the Project route is open.

4.9 The Saddle Road and Pahiatua Track are unforgiving roads for cyclists. In places they have limited forward visibility, narrow shoulders and potentially high-speed traffic adjacent. Given these roads deficiencies, any mistake made by a cyclist or other vehicle is exacerbated, meaning there is a higher risk of an accident, and a higher risk that any accident will result in a fatal or serious injury. I do not consider these routes to be safe cycling routes.

Cycle Use of Project Route

4.10 Cyclists often select their route based on how attractive it is to them. There are a number of factors which will influence this decision. Some include:

(a) the type of cycle facility provided (separated or on road; sealed or unsealed; if on-road, the sealed width);
(b) the steepness and length of any gradient;
(c) the volume and speed of adjacent traffic;
(d) the perceived safety of the route, even if the actual safety risk does not match this; and
(e) how enjoyable the route is including potential views.

4.11 **Mr Dunlop** demonstrates in his evidence the comparison between the profiles of the Project route, the Saddle Road and Pahiatua Track (paragraph 123). **Mr Kennett** identifies in his evidence (paragraph 18(p)) that *the new road would be physically easier and faster to cycle on than Saddle Road or Pahiatua Track given that the total distance and amount of climbing would be less*.

4.12 I agree with **Mr Kennett** (paragraph 18(u)) that a new route would form an appealing loop between Ashhurst and Woodville. It could also be used for travel in both directions by cyclists who wished to avoid travelling over the Saddle Road.

4.13 **Mr Kennett's** evidence (paragraph 19) provides project user estimates for three different path types. I note that for a sealed path near the highway, 2,000 commuters per year, 5,000 local recreational riders and walkers, and 1,400 touring cyclists were estimated. I would anticipate that these users would not be spread evenly throughout the year, and that there would be a large peak of users over the summer months. **Mr Dunlop** does not include the estimated 5,000 recreational users when considering the demand for cycling in his evidence (paragraph 211(c)).

4.14 Cyclists will choose their route based on a number of factors. While cycling alongside a high-speed, busy road would not generally be favoured, neither would cycling along steep, winding roads with limited visibility around some corners and no safe shoulder. On balance, I consider that the Project as it is currently proposed with a sealed shoulder only for cyclists, will be an attractive option for cyclists compared to the Saddle or Pahiatua Track, and is likely to be used by them as a result. In my view, this increases the importance of making safe provision for cyclists on the route.

5. TECHNICAL DOCUMENTS RELEVANT TO CONSIDERATION OF CYCLING PROVISION

5.1 There are a number of relevant road safety strategies, best practice design documentation and Transport Agency documentation which should be considered when designing cycling provision for the Project. Within this section I introduce those documents which should be considered, how they are relevant, and what they recommend. These documents have informed my assessment of the adequacy of cycling provision made as part of the Project. I summarise my assessment in the following section.

Safer Journeys & the Safe System

5.2 Safer Journeys 2010-2020, developed by the Ministry of Transport, is designed to guide New Zealand's efforts to improve road safety. It sets out the direction and actions to be taken in an effort to reduce the number of deaths and injuries on New Zealand roads. Its aim is that death and injury will in the future no longer be an inevitable part of our road system. To achieve this aim, the strategy outlines a Safe System. The Transport Agency states on its website that it is continuing to work towards embracing the Safe System approach.[1]

5.3 The Safe System looks beyond the road user and examines the entire road system to improve safety by creating safer roads and roadsides, safer speeds, safer vehicles and safer road use. The Safe System is underpinned by the following four principles:

(a) **people make mistakes**, and some crashes are inevitable;
(b) **people are vulnerable**, and human bodies are not designed to withstand crash forces without being seriously injured or killed;
(c) **there is a shared responsibility** among all those who input into the road system and those who use it; and
(d) **all parts of the system need to be strengthened** so that if one part fails, other parts will still protect the people involved.

1 https://www.nzta.govt.nz/roads-and-rail/road-engineering/safety/safe-system/

5.4 A Safe System manages the forces of a crash to a level that the human body can tolerate without serious injury. In a high-speed environment, any crash involving vulnerable road users, including cyclists, is likely to result in a death or serious injury. Figures from *New Zealand Transport Agency Publication: Embedding the Safe System approach to road safety (August 2012)* and *Research Report 589: Improving safety for people who cycle on rural roads (June 2016)* shown in **Appendix A** demonstrate the fatality risk for vulnerable road users at different collision speeds. Both figures show that in high speed environments (80-100km/h vehicle speed) the likelihood of a fatality occurring in a collision between a vehicle and a vulnerable road user is extremely high (>80%). It is likely that if the crash did not result in a fatality, it would result in a serious injury.

5.5 By improving the safety of the roads and roadsides, the likelihood of crashes occurring can be reduced, and the consequence of those crashes can be minimised. Under a Safe System approach, vulnerable road users would ideally be separated from high speed busy traffic. This significantly reduces or completely removes the chance of a high-speed collision with a vehicle, depending on the separation type and distance;

One Network Road Classification

5.6 The One Network Road Classification (**ONRC**), developed by a joint local government, Transport Agency, Department of Conservation and Ministry of Transport Project Team, divides New Zealand's roads into six categories based on how busy they are, whether they connect to important destinations, or are the only route available. The ONRC was developed to help the planning, investment, maintenance and operation of the road network (across state highways and local roads) in a more strategic, integrated, consistent and affordable way throughout the country. The six categories are National, Arterial, Regional, Primary Collector, Secondary Collector and Access.

5.7 The state highway network between Levin and the Hawke's Bay is considered to be a National road under the ONRC.[2] This is the highest

2 NZ Transport Agency One Network Road Classification GIS Map.

ONRC level of roads. The ONRC Performance Measures (A General Guide)[3] describe the six categories with National roads described as:

> *These make the largest contribution to the social and economic wellbeing of New Zealand by connecting major population centres, major ports or international airports, and have high volumes of heavy commercial vehicles or general traffic.*

5.8 The Manawatu Gorge Alternatives Detailed Business Case (**DBC**) confirmed that the Manawatu Gorge Alternative route was to be designed to meet the user requirements of a National road.[4]

5.9 The ONRC Performance Measures (A General Guide) states that *Once a road has been classified under the ONRC, it should be maintained to the Customer Level of Service (CLoS) for roads of its type.* Fit for Purpose Customer Levels of Service (**CLoS**) Outcomes (Provisional)[5] were developed by the Road Efficiency Group (**REG**) and signed off by the REG Governance Group December 2013.

5.10 REG is a collaborative initiative between the NZ Transport Agency, Local Government New Zealand (**LGNZ**) and the Road Controlling Authorities (**RCAs**) of New Zealand.[6] The REG partnership is focused on delivering change that will transform the transport sector. REG has led the development of the ONRC, including the Performance Measures and the Provisional Customer Level of Service. The REG Governance Group is made up of members from the Transport Agency, Local Government NZ and Road Controlling Authorities.

5.11 The ONRC CLoS define what the fit for purpose outcomes are for each category in terms of mobility, safety, accessibility and amenity. For National roads, CLoS defines the following outcomes as being sought:

---

3 https://www.nzta.govt.nz/assets/Road-Efficiency-Group-2/docs/NZTA160801-The-ONRC-Performance-Measures-Final-Published.pdf
4 Manawatu Gorge Alternative Detailed Business Case. Page 31.
5 https://www.nzta.govt.nz/assets/Road-Efficiency-Group-2/docs/customer-levels-of-service.pdf
6 https://www.nzta.govt.nz/roads-and-rail/road-efficiency-group/

(a) the majority of road users experience consistent travel times with some exceptions in urban heavy peak, holiday or during major events;

(b) route is always available during major weather or emergency events and viable alternative exist. Rapid clearance of incidents affecting road users. Road users are generally advised in advance of issues and incidents;

(c) higher speeds depending on assessed level of risk. Lower if mixed use, high intersection density, schools, shopping, concentrations of active road users;

(d) a high KiwiRAP 3 or 4-star standard, or equivalent, with consistent and predictable alignment. User hazards mostly mitigated. Active road users (if present) are mostly provided with separate space or are physically separated. Some lower standards and / or winding sections may require lower speeds and extra care. High level of road user safety guidance provided;

(e) high level of comfort, infrequent roughness. Aesthetics of adjacent road environment reflects journey experience needs of higher numbers of through traffic users. Character of scenic / tourist routes protected and enhanced;

(f) land use access for road users infrequent and highly restricted in rural areas, and often restricted in urban areas. Mainly strategic network connectivity for road users due to infrequent connections, generally only to other equal and high category roads. Network access and journey continuity for active road users (if present) mostly provided by separate space or physical separation. Easy navigation at intersections, with National road traffic given priority, unless joining with equal or high category roads. Provision of quality information relevant to national road user needs.

5.12 The ONRC is relevant to consider as it provides clarity about what would make a road fit for purpose, and the Transport Agency has been a leader in its formation and implementation. The Transport Agency continues to work with RCAs, through REG, in delivering improvements that lead to a better implementation of the ONRC. I consider that to meet the fit for purpose outcomes sought for a National road under the ONRC, active road users, including cyclists, should be separated from other vehicles.

Road Safety Audit

5.13 As part of DBC, a road safety audit was undertaken. The road safety audit considers the safety of all road users and qualitatively reports on road safety issues or opportunities for safety improvement. The primary objective of a road safety audit is to support the delivery of a project that achieves an outcome consistent with Safer Journeys and the Safe System approach.

5.14 The DBC road safety audit raises significant concern with the provision made for cyclists within the proposed cross-section. The following is included at Section 2.2.10:

> *The (Safety Audit Team) SAT understands that although there is the possibility of cyclists using the existing highway, this is not confirmed and there is still likely to be a reasonable recreational cycling demand along the route based on discussion with the design team. The (Design Philosophy Statement) DPS states that "The design philosophy adopted during the development of the geometry is to deliver a national route (as classified under the One Network Road Classification).*
>
> *The SAT notes that the One Network Road Classification (ONRC) customer levels of service for a national route for safety notes: "Active road users (if present) are mostly provided with separate space or are physically separated.*
>
> *Austroads recommends a sealed shoulder width of 2.5m (1.5m cycle space + 1.0m buffer to an adjacent truck). The 1.0m buffer is the desirable clearance at 60 km/h (preferred is 1.5m), at 100 km/h the width is desirably 2.0m (2.5m preferred). A minimum 0.5m offset from a barrier is also desired, the current design includes a 0.5m section of unsealed barrier between the edge of the seal and barrier face. This transition is undesirable from a cyclist's perspective because of the potential for a lip to form with successive overlays. The SAT also notes that current best practice is to extend the seal to behind the*

barrier to reduce maintenance costs and loose material encroaching onto the carriageway.

Recommendation:

Consider providing a high quality / high-speed off-road path separated from the highway or widen the shoulders in accordance with best practice.

5.15 **Mr Dunlop's** evidence (paragraph 211) notes two updates to the project scope since the road safety audit was undertaken: an increase in sealed shoulder width to 2.0m and roundabouts at the tie-ins. I agree that the increase in sealed shoulder width would provide a marginal benefit to cyclists. While the roundabouts will provide an improved safety level of service to vehicles at the intersection, I do not consider that the roundabouts provide any benefit to cyclists. While they may moderate speeds of approach vehicles to the new alignment, for the majority of the approximately 11km between the two intersections, vehicles will be travelling at their free-flow speed;

5.16 At paragraph 211(c) **Mr Dunlop** stated that the demand for cycling was completely unknown at the time of the road safety audit. He references **Mr Kennett's** evidence regarding estimated demand of a separated facility close to the alignment though fails to include the 5,000 estimated recreational users. The SAT assumed that there would be some recreational cycling demand along the route. In my view, the assumptions made by the SAT are aligned with the estimates made by **Mr Kennett**. I agree that there is a greater understanding of the potential cycle demand now than at the time of the road safety audit. However, I do not agree that this affects the road safety audit recommendation.

5.17 While the increase in sealed shoulder width would provide a small benefit to cyclists, in my view the crux of the concern raised by the SAT still remains. The design does not provide a high quality / high-speed off-road path separated from the highway or meet the best practice sealed shoulder width as recommended by the SAT.

Best Practice Design Guidance

5.18 The Transport Agency's website states 'The Transport Agency use the Austroads guide to road design as the primary reference guideline for New Zealand's road network'.[7] Where important New Zealand specific variations and interpretations that reflect our unique terrain, driving conditions and road rules are necessary, these are provided as supplementary guidance by the Transport Agency.

5.19 The Transport Agency Technical Memorandum TM-2503 *Guidelines for Edge Protection and Medians on Dual Carriageway Roads, incorporating a Safe System Philosophy* (**Technical Memorandum**)[8] is also relevant in the design of the Project. It provides the Safe System philosophy for dual carriageway roads and how this might vary with context. Given the majority of the Project will be a divided, dual carriageway road, it is appropriate to consider this Technical Memorandum. Te Ahu a Turanga: Manawatu Tararua Highway Project: Assessment of Effects on the Environment: Appendix 3. Road Design Philosophy Statement (**DPS**) Section 4 Geometric Design lists this Technical Memorandum as one of the design publications for the Project.

5.20 The Technical Memorandum does not provide any specific standards for accommodating cyclists on the shoulder of dual carriageway roads as they are not anticipated on these types of roads in the design standard. It refers instead to considerations in the relevant Austroads guides.[9] The Technical Memorandum provides the following specific consideration to Cyclists:

> *Applying the Safe System principles separates vulnerable users from the higher speed expressway traffic. Therefore, off-road cycle facilities and alternative routes are to be provided and promoted wherever practicable, including the use of lengths of replaced or redundant state highway.*

7 https://www.nzta.govt.nz/roads-and-rail/highways-information-portal/technical-disciplines/safety-and-geometric-design/geometric-design/
8 https://www.nzta.govt.nz/assets/resources/dual-carriageway-safe-system/docs/dual-carriageway-safe-system.pdf
9 Austroads Guide to Road Design Part 3: Geometric Design.

5.21 Separately, the Technical Memorandum provides a recommended roadside treatment for dual carriageway roads. The Technical Memorandum recommended practice for shoulder widths and offsets from the traffic lane to the roadside barrier are 2.5m and 3.0m respectively. This recommended roadside treatment allows the space needed for a driver to stop and get out of the vehicle safely. The shoulder width recommended does not consider the requirements of cyclists.

5.22 Austroads Guide to Road Design Part 3: Geometric Design has several sections which are relevant for the Project. These sections consider suitable standards for rural road widths, roadside shoulders (sealed and unsealed), cross-sections and clearances for bicycles, and bicycle facilities. The DPS Section 4 Geometric Design lists this Austroads guide as one of the design publications for the Project.

5.23 Austroads[10] recommends lane and shoulder widths for rural divided carriageway roads. Table 4.6 recommends that for a divided carriageway with a design AADT of less than 20,000 a left shoulder width of 2.5m should be provided with 1.5m of that sealed. It notes that *Wider shoulder seals may be appropriate depending on requirements for cyclists, maintenance costs and soil and climatic conditions* and *Full width shoulder seals are appropriate beside road safety barriers and on the high side of superelevation.* The notes included as part of the table recommend that consideration should be given to increasing the sealed shoulder width beyond that stated to accommodate cyclists.

5.24 Austroads[11] provides the space that a cyclist can expect to occupy on the road (cyclist envelope) and the recommended clearances necessary between it and adjacent vehicles:

(a) Figure 4.27 provides the cyclist envelope. The cyclist envelope, which includes space for sideways motion while riding due to deviations in course caused by exertion, wind, surface variations and sudden shock reactions, is 1.0m. In addition, a minimum

10 Austroads Guide to Road Design Part 3: Geometric Design. Table 4.6 Divided carriageway rural road widths.
11 Austroads Guide to Road Design Part 3: Geometric Design Section 4.8.4 Cross-Section and Clearances.

clearance of 0.2m and desirable clearance of 0.5m from walls, fences poles and bollards is required.

(b) Figure 4.28 provides the following clearances from the cyclist envelope to the edge an adjacent motor vehicle:

(i) For a speed limit of 60km/h, a minimum clearance of 1.0m and a preferred clearance of 1.5m;

(ii) For a speed limit of 70 or 80 km/h, a minimum clearance of 1.5m and a preferred clearance of 2.0m; and

(iii) For a speed limit of 100km/h, a minimum clearance of 2.0m and a preferred clearance of 2.5m.

(c) For the Project, cyclist deviations due to exertion and wind may be particularly likely given the gradient of the route and the wind environment. For this reason, I consider it appropriate to apply the preferred clearance rather than the minimum clearance.

5.25 **Mr Dunlop's** evidence (paragraph 207) provided the following extract from Section 4.8.9: Sealed Shoulders:

> *Table 4.4 provides guidance as to the appropriate shoulder width to be provided generally for reasons other than cycling. However, where the shoulder is available for use by cyclists, Table 4.18 (for exclusive bicycle lanes in urban areas) should be used as a guide to the appropriate width of sealed shoulders.*

5.26 Table 4.18 provides a desirable minimum width of 2.5m with an acceptable range of 2.0-3.0m. The section also provides the following:

> *It should be noted that urban roads with a posted speed greater than 80 km/h (e.g. 100 km/h) will usually be a freeway or expressway that carries a high volume of high speed traffic. In this case it is essential that cyclists are provided with facilities that comply with Safe System principles, namely physically separated bicycle lanes or paths that are protected by safety barriers, and grade separations or controlled crossings at interchanges.*

5.27 The Technical Memorandum and the Austroads guide state that applying the Safe System principles separates vulnerable road users from higher

speed, expressway traffic. In my view, in order for the Project to meet the standards desired under the Safe System approach, a separate facility needs to be provided.

5.28 The Technical Memorandum and Austroads guide recommend a shoulder width of 2.5m between the edge line and roadside barrier. The recommended sealed width of this shoulder varies between 2.0m and 1.5 for the Technical Memorandum and Austroads guide respectively. Both documents recommend that where cyclists are expected on the road, specific design consideration should be given to them.

5.29 I discussed that I anticipated cyclists will utilise the Project route. Where cyclists are expected to use the sealed shoulder of dual carriageway roads, the best practice guidance recommend specific design consideration should be given to them. The recommended clearance is based on the adjacent vehicle speed. I discuss vehicle speeds on the route and recommended sealed shoulder width to accommodate cyclists below.

Other Design Guidance

5.30 The Transport Agency's *Specification for Design, Construction and Maintenance of Cycling and Shared Path Facilities*[12] was published on their website in January 2019 and dated September 2018. The specification details the requirements for the design, construction and maintenance of cycling and shared path facilities on the state highway network or local road corridors that are maintained and managed by the Transport Agency.

5.31 Appendix 3 of **Ms Fraser's** evidence provided a table displaying the Target Shoulder Seal Width for State Highway Cycling Network. Based on the anticipated traffic volume (8,000-18,000 AADT), adjacent lane width (3.5m) and vehicle speed (100 km/hr) the specification target shoulder seal width was 2.0m. The specification does not confirm if any adjustment needs to be made to accommodate a roadside barrier.

12 https://www.nzta.govt.nz/resources/specification-for-design-construction-and-maintenance-of-cycling-and-shared-path-facilities/

5.32 The specification also provides the following guidance for high volume roads:

> *For high volume roads (AADT 8000+), refer to national and local cycle network plans, as alternatives such as off-road cycle paths or parallel local roads may have been identified. In such cases, for some sections, the cycling network target width for highway shoulders may not be required.*

5.33 **Mr Dunlop's** evidence (paragraph 206) states that the 2.0m sealed shoulder width meets the Transport Agency's own specification for Design (Appendix 3 of Ms Fraser's evidence). This ignores the Technical Memorandum which the DPS confirmed was part of the Project design documentation. This Technical Memorandum is also the Transport Agency's own specification for design of dual carriageway roads which the Project is.

6. CONCERNS WITH APPROACH TAKEN TO CYCLE FACILITIES BY THE PROPOSED PROJECT

6.1 Safer Journeys and the Safe System approach set the key road safety design direction for the Project. Section 3.2 of the DPS confirms that the Safe System approach is to be followed in the design of the Project. However, in my view this has not been done. I hold this view because the Project does not provide for vulnerable road users separate to high-speed busy traffic along the route.

6.2 The DBC confirmed that the Manawatu Gorge Alternative route was to be designed to meet the user requirements of a National road. In my opinion, the CLoS should be applied in a consistent manner for all road users. For pedestrians and cyclists on a high speed National road, this means that a separated space should be provided.

6.3 I consider the Transport Agency Technical Memorandum TM-2503 *Guidelines for Edge Protection and Medians on Dual Carriageway Roads, incorporating a Safe System Philosophy* and Austroads Guide to Road Design Part 3: Geometric Design to be the best practice design guidance for the provision of cycling facilities for the Project. Both guidelines

recommend separated cycle facilities in order to meet the Safe System approach.

6.4 I share **Ms Fraser's** concerns (paragraph 112) regarding the use of the *Specification for Design, Construction and Maintenance of Cycling and Shared Path Facilities* as design guidance for the shoulders on the Project route. Particularly:

(a) The basis for the shoulder widths included in the table is not provided and there is no reference to any recognised best practice documents;

(b) It is not clear that the document relates to shoulder widths for the construction of new roads. It refers primarily to maintenance and renewal activities;

(c) The Transport Agency have not published the Specification as supplementary guidance to Austroads therefore I would not consider it as a best practice document in New Zealand;

(d) It is not to the same standard as the Technical Memorandum and Austroads guidance. No explanation or justification is provided for this departure from accepted best practice.

6.5 I do not consider that the provision made for cyclists as part of the Project, is to the standard expected under the Safe System approach, or that best practice road design been applied. It is my view that in order to meet the Safe System approach, the ONRC CLoS and best practice design guidance, a separated cycle facility should be provided for the length of the Project including bridges.

6.6 Saddle Road and the Pahiatua Track are being proposed as suitable cycling alternatives once the Project is open. I agree with **Mr Dunlop** (paragraph 214) that the reduced traffic volumes on these routes will result in a safer environment for cyclists than exists on those roads at present. I am of the view however, given the vertical and horizontal alignment of these routes, potentially high vehicle speeds, and inconsistent shoulder widths, that neither route should be considered a safe cycling route.

6.7 I consider that the Project route will be an attractive option for cyclists compared to the Saddle or Pahiatua Track, and therefore an appropriate

facility that meets the Safe System approach for cyclists should be provided.

6.8 Safer Journeys, the ONRC, and the best practice road design in the Transport Agency's Technical Memorandum and Austroads all support use of the Safe System approach when considering vulnerable road users including cyclists. In my view, for the Project to meet the intention of the Safe System approach, a separated cycling facility should be provided. Any on road facility including sealed shoulders will place cyclists in potential conflict with high-speed vehicles.

6.9 While I do not consider a sealed shoulder appropriate cyclist provision for the Project to meet the Safe System approach, because it places vulnerable road users in potential conflict with high-speed vehicles, in points 6.10 and 6.11 I comment on what an acceptable shoulder width would be to accommodate cyclists based on best practice design guidance previously discussed.

6.10 **Mr Dunlop's** evidence (paragraph 179) states that *calculations showed HCV speeds varied between 90km/h and 33km/h with an average speed of around 60km/h*. I agree that heavy vehicles may not be able to travel at 90-100km/h for the entire length of the Project. They will be able to travel at these higher speeds for portions of the Project. I also expect there will light vehicles in the adjacent lane travelling at 100-110km/h. Figure 4.28 of the Austroads guidance provides minimum and preferred road clearances to all vehicles, not just heavy vehicles.

6.11 I agree with **Ms Fraser's** assessment (paragraphs 106-109) that best practice shoulder width where there is a speed limit of 100km/h, and cyclists are expected to ride would be 3.5m plus a 0.2-0.5 clearance to any side barrier or structure. I based my assessment of the clearance to the cyclist envelope on Figure 4.28 rather than Table 4.17 as **Ms Fraser** has.

6.12 **Mr Whaley** provided an updated typical cross-section as part of his evidence (paragraph 40, Figure 4). This includes a 2.0m sealed shoulder. **Ms Downs'** evidence (paragraph 54(b)) provides that *the new road will a 2m-wide space between the outer barriers and active traffic lanes that is*

able to be used by cyclists. Irrespective of providing for cyclists or not, I do not consider that this shoulder width meets the best practice guidelines relevant for the project in the DPS. Specifically, *NZ Transport Agency Technical Memorandum TM—2503* and *Austroads Guide to Road Design – Part 3: Geometric Design*.

7. USE OF FACILITIES FOR WALKING

7.1 The Transportation Technical Assessment stated that the Manawatu Gorge walking track is expected to remain as the primary walking route between the western and eastern ends of the Gorge (paragraph 41). I agree that this path is an acceptable route for walking, though it does not provide a link over the same length as the Project. An on-road section between the eastern end of the gorge and Woodville would remain for walkers.

7.2 The Project will legally allow walkers on the route. As the Project is currently designed, these users would need to walk along the shoulder of the road, most likely on the sealed shoulder or on the outside of the roadside barrier. I do not consider that the Project as it is currently proposed will attract walkers on the Project route.

7.3 **Ms Downs** confirms in her evidence (paragraph 54 (h)) that a dedicated pedestrian facility in some form will be provided on the new Manawatu River Bridge. I support provision of a safe facility for pedestrians on the bridge as I consider it likely the public would be attracted to the bridge given the potential views up the Gorge.

7.4 In my view if a separated facility were to be provided as part of the Project, this would be utilised by recreational walkers. This could be walking return to a particular view point. It would also form a long loop walk with the existing path south of the Gorge. I agree with **Ms Fraser** (paragraph 198) that the use by these users would be occasional. Or at least less regular than cyclists given length of the route.

8. SEPARATED FACILITY DESIGN

8.1 A separated facility constructed as part of the Project will attract both walkers and cyclists. I consider though that the primary users will be cyclists, with walker secondary. For this reason, I consider it appropriate to design a bicycle path as was suggested by **Ms Fraser** in her evidence (paragraph 118).

8.2 Austroads[13] recommends bicycle paths widths based on their anticipated use. A 3.0m bicycle path width is desirable where high speeds are possible. I consider this to be an appropriate width for a path that follows the Project route given the gradients and associated high cyclists' speed.

8.3 Austroads[14] recommends clearances between a cyclist envelope and potential path hazards. For the Project, this could be an adjacent barrier, fill slope or similar. For paths that cyclists use, the recommended clearance to a wall / fence barrier or fixed object is 1.0m with an absolute minimum of 0.5m. The clearance is greater than the 0.2m recommended by **Ms Fraser** in her evidence.

8.4 Based on Austroads guidance, the recommended path for walkers and cyclists is 3.0m in width with a minimum 0.5m clearance to any fixed hazards. In my view, this design standard should be followed.

9. RESPONSE TO SECTION 42A REPORT

Traffic and Transport Evidence by Harriet Fraser

9.1 I have reviewed the Traffic and Transport evidence by **Ms Fraser**, particularly paragraphs 83 – 96 related to the road safety audit and paragraphs 103 - 119, 138 - 139 & 141 related to the Project cyclist provision.

9.2 I support **Ms Fraser's** assessment of best practice provision for cyclists (paragraphs 104 to 119) with some clarifications as I have previously

13 Austroads Guide to Road Design Part 6A: Paths for Walking and Cycling Section 5.1.4.
14 Austroads Guide to Road Design Part 6A: Paths for Walking and Cycling Section 5.5.1.

presented. In particular I share **Ms Fraser's** concern (paragraph 116) over the lack of regard for both best practice and the recognised road safety audit procedures. I agree with her view that consideration should be given to the alternative of a barrier separated two-way path along one side of the carriageway.

9.3 Paragraph 114 (a) states *…my expectation is that the outside lane will be used by traffic travelling at a range of seeds from trucks struggling with the incline to more powerful trucks travelling at 90 to 100km/h and light vehicles travelling at up to 110 km/h. In the downhill direction trucks will be able to travel at speeds closer to that of light vehicles. As such, I totally disagree with the assumption that the maximum speed will be 60km/h.* I agree with **Ms Fraser** that there will be a range of vehicles and vehicle speeds in the outside lane of each direction. The percentage of heavy vehicles using the Gorge route pre- closure was approximately 12%.[15] This means that approximately 88% of vehicles are more likely to be capable of travelling at higher speeds. In my view, it is appropriate to consider a 100km/h vehicle speed in the cross-section design rather than **Mr Dunlop's** suggested 60km/h.

9.4 **Ms Fraser** questions whether a full dual carriageway arrangement along the whole alignment is the best outcome (paragraph 138). I have concerns with this arrangement if no separate facility is provided. When there is one traffic lane per direction, the per direction sealed cross section is likely to be greater 6.5m plus additional clearance to the median and side barriers. This could provide enough width that the shoulder acts as a de facto crawler lane for slow moving vehicles. This would put vehicles in this situation is direct conflict with cyclists riding on the sealed shoulder. I would support **Ms Fraser's** suggestion, if it enabled a high quality separated cycling facility to be constructed.

9.5 For the reasons in my evidence, I support Ms Fraser's agreement with the recommendation made by the road safety audit to include a high quality / high speed off-road path separated from the highway or widen the shoulders in accordance with best practice.

15 Te Ahu a Turanga: Manawatu Tararua Highway Project: Technical Assessment #1 Transport.

10. RESPONSE TO NZTA EVIDENCE

Evidence of Sarah Downs – Portfolio Manager System Design Developing Regions

10.1 The final sentence of paragraph 12 (reference paragraph 38) of **Ms Downs'** evidence states *the objectives for the Project are to reconnect people via a high-quality connection – more efficient, more resilient, and safer – than was provided by the Gorge Road.* Table 5 Investment objectives – measures, descriptions and rational of the DBC[16] included the following under the rationale for the Safety investment objective. *Safety is a primary responsibility for all levels of government and organisations responsible for providing transport infrastructure and services. In particular it is important to provide state highways that meet design requirements that are safe for all road users.* I consider that **Ms Downs'** statement above is at odds with the rationale for the Safety investment objective in the DBC. In my view, there was a clear direction set in the DBC to provide roads that meet design requirements and is safe for all road users, including walkers and cyclists, not just one that is safer the previous or the existing.

10.2 Paragraph 54(b) states *the new road will provide a 2m-wide space between the outer barriers and active traffic lanes that is able to be used by cyclists. This meets the Transport Agency's standards for walking and cycling on a rural highway.* As previously discussed, I do not agree with the design approach taken for this aspect, and do not view the 2m wide sealed shoulder as meeting best practice design guidance.

10.3 Paragraph 54(h) states *the new crossing of the River will be future-proofed by incorporating a dedicated pedestrian facility in some form (as well as cyclable shoulders, subject to working through the details with designers, tangata whenua, landowners, and other.* I support the inclusion of a fully separated pathway on the new Manawatu River Bridge. In my view, the public would use the bridge for its views along the Manawatu River and up the Gorge. Providing a safe location for them to do this is important. I consider that provision should be made for cyclists within any separated facility as opposed to on the shoulder.

16 Manawatu Gorge Alternatives Detailed Business Case.

10.4 At paragraph 49 **Mr Dunlop** states that *in my view the Project will significantly improve conditions for cyclists, including by facilitating improved safety conditions on the Pahiatua Track and Saddle Road and through the provision of appropriate wide shoulders along the Project route.* I agree that safety for cyclists on the Saddle Road and Pahiatua Track will improve on completion of the Project due to the reduction in traffic volumes on the two alternate routes. For the reasons I provided previously, I do not agree that these routes will be safe cycling routes. None of the routes would meet the level of service anticipated for vulnerable road users under the Safe System approach or ONRC.

10.5 Paragraph 56 states *in addition, the changes made to Saddle Road by the Transport Agency and partners during the closure of the Manawatu Gorge have provided additional width and improved safety, while posted speeds have also been reduced*. In my view, it should not be assumed that the current posted speed limit of 60km/h will remain over some or all of the Saddle Road after the Project is complete. The RCAs may choose to reinstate the previous or another speed limit.

10.6 Paragraphs 60 and 206 state that it is the intention of the Project to comply with the Transport Agency's design specification[17] for cyclists. As discussed above, I do not consider that this Specification is best practice design guidance for the Project. It is in conflict the Transport Agency's own Technical Memorandum which the DPS confirmed was part of the design documentation for the Project. In my view, the design is ignoring best practice guidance.

10.7 Paragraphs 62 and 208 state that calculations show that the average speed of Heavy vehicles in the left-hand 'crawler lane' would be 60km/h. **Mr Dunlop** considers this average speed an appropriate basis for interpretation of the Austroads requirements. My response to this is the same as my support of **Ms Fraser's** assessment on this matter. There will be a range of vehicles travelling at a range of speeds in the left-hand lane. Many of them will be travelling at up to and even above 100km/h. I

17 Transport Agency Specification for Design, Construction and Maintenance of Cycling and Shared Path Facilities.

consider it appropriate to design the cross-section to 100km/h which is more representative of all vehicles along the route, rather than the average speed heavy vehicles may travel.

10.8 Paragraph 209 states *The Project Route, in accordance with the objectives of the Project, has been designed in accordance with a safe system approach for vehicles.* In my view, considering only vehicles ignores the full intent of the Safe System approach. The Safe System approach provides for all road users. Vulnerable road users, including cyclists, need particular consideration when it is expected they will be present. Given the apparent agreement that the Project route will attract cyclists, it is appropriate that the Safe System approach applies to them also.

10.9 Paragraph 93 considers rest (or viewing) areas to be included as part of the Project. In my view, it is important that rest areas are located at the most attractive locations for views along the route. They should also be adequately signposted far in advance. If they are not, vehicles may be more likely to stop on the sealed shoulder along the route. This would obstruct cyclists and require any cyclists riding on the sealed shoulder into the traffic lane. This would place them in direct conflict with high-speed vehicles increasing the risk of an incident.

Evidence of Jonathan Kennett – Walking and Cycling

10.10 Paragraph 18 identifies a number of key assumptions and inputs that would influence the use of any walking and cycling path: I generally agree with the points raised by **Mr Kennett**. Points that I consider to be particularly relevant when considering providing a facility that is safer and more attractive for cyclists than the Saddle Road, Pahiatua Track and new Project route are as follows:

(i) *If the surface was sealed, it would be used by road cyclists. However, more and more road cyclists are buying 'gravel bikes' to get away from traffic by riding on gravel roads and trails.*

(j) *The new road would be physically easier and faster to cycle on than Saddle Road or Pahiatua Track given that the total distance and amount of climbing would be less.*

10.11 The final two sentences in paragraph 47 state *A shoulder does not provide the separation of a physical barrier that would avoid altogether the risk of a conflict between a motor vehicle and a cyclist. However, the proposed shoulder width, in conjunction with ATP (rumble strips) between the shoulders and traffic lanes, and 'shy space' between the shoulder and roadside barrier, will provide a considerably higher level of safety for cyclists than the old Manawatu Gorge road did.* I agree that the Project with 2.0m sealed shoulders will provide an improvement for pedestrians and cyclists over the old Gorge Road. I do not agree however that this level of safety meets that expected under the Safe System approach. In order to meet this level of safety for vulnerable road users, a separated facility should be provided.

11. CONCLUSION

11.1 Safer Journeys, the ONRC, and best practice road design all support use of the Safe System approach when considering vulnerable road users including cyclists for high-speed, dual carriageway roads such as the Project.

11.2 The Saddle Road and Pahiatua Track are unforgiving roads for cyclists. In places these roads have limited forward visibility, narrow shoulders and potentially high-speed traffic adjacent. Given these roads deficiencies, any mistake made by a cyclist or other vehicle is exacerbated, meaning there is a higher risk of an accident, and a higher risk that any accident will result in a fatal or serious injury. I do not consider these roads to be safe cycling routes.

11.3 The Project route is expected to be an attractive route for cyclists compared to the Saddle Road and Pahiatua Track. An appropriate facility that meets the Safe System approach for cyclists should be provided. In my view, in order to meet the Safe System approach, a separated facility should be provided for vulnerable road users as part of the Project.

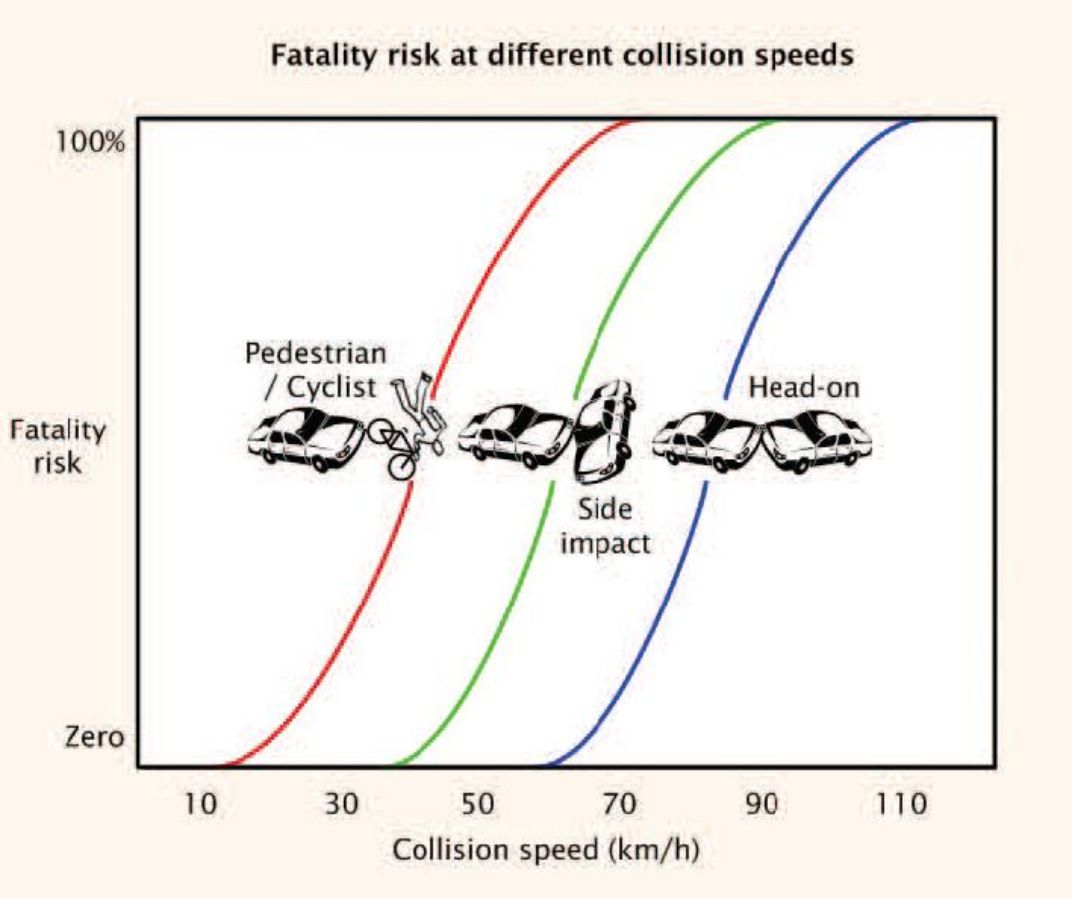
11.4 I disagree that the Transport Agency's proposed shoulder width of 2m for the Project is adequate for cyclists or meets recommended best practice. Should a separated facility not be provided for vulnerable road users, the

sealed shoulder width should be increased to comply with recommended best practice.

Mark Aaron Read
15 March 2019

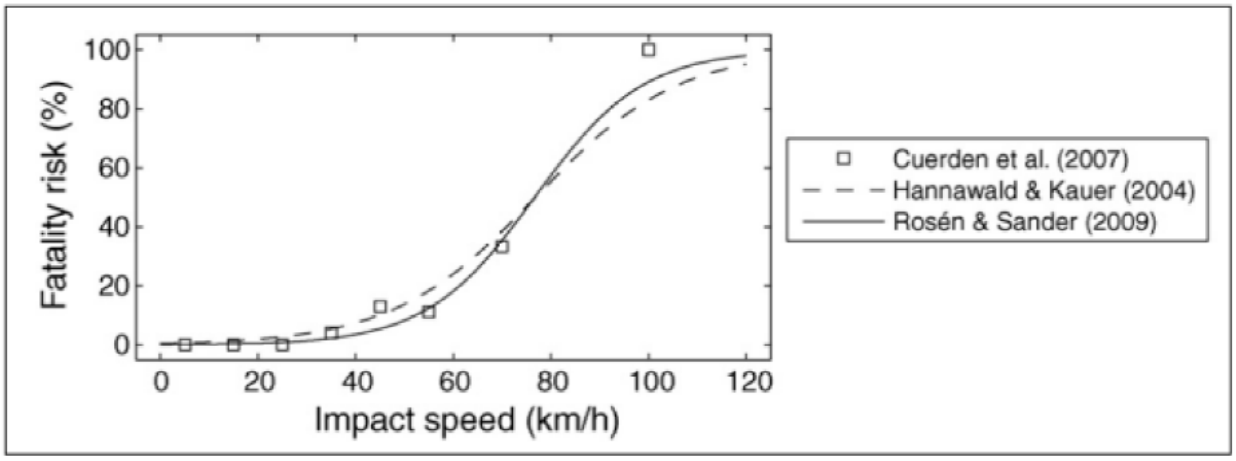
APPENDIX A: FATALITY RISK AT DIFFERENT COLLISION SPEEDS

New Zealand Transport Agency Publication: Embedding the Safe System approach to road safety (August 2012)



Research Report 589: Improving safety for people who cycle on rural roads (June 2016)

Figure 2.8 Pedestrian fatality risk versus motor vehicle impact speed during a collision with a passenger car

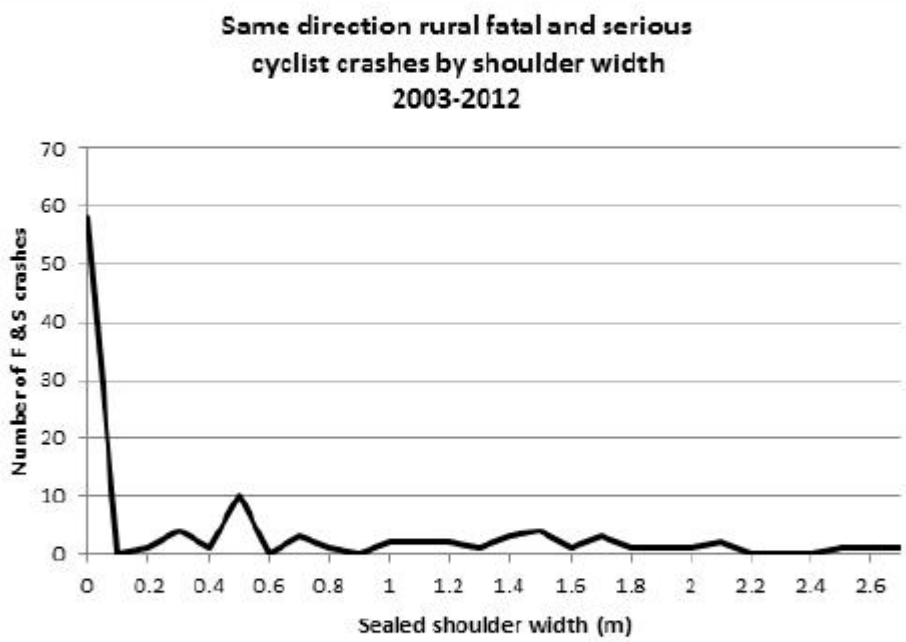


Source: Rosen et al (2011)

APPENDIX B: FATAL AND SERIOUS CYCLISTS CRASHES BY SHOULDER WIDTH

Safer Journeys for People Who Cycle (December 2014)

Lack of shoulder width is a significant factor. Rural cyclist crashes were plotted on a map and the sealed shoulder width compared to records and aerial photos. Crashes are scattered widely across the network and the majority happen occur where there is no road shoulder – see figure below.



The lack of shoulder width, particularly between 0 and 1 metre, results in a greater risk to cyclists from heavy vehicles which require more room to overtake safely. Other rural road crashes are 'fail to give way' conflicts with similar issues to the urban problems.