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The Value of Technical Peer Reviews

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Abstract

The relatively limited number of experienced cycle facility designers in New Zealand means there is great value to be gained through the careful use of a peer review process. Auckland City Council has recently gained value and identified innovative design solutions through the use of a technical peer review, which in turn assists inexperienced designers in future projects and raises the quality of cycle projects all round.

Auckland City Council recently engaged ViaStrada Ltd (formerly called Traffix) to undertake a peer review of a group of cycling projects, and was able to achieve improved design quality and identify several innovative solutions to difficult design problems. Peer reviewing a number of projects collectively rather than individually is more cost-effective for a council, and the use of an independent peer reviewer reassures politicians and ratepayers that the best project is being developed – an important issue when there can be limited support for cycling projects.

Auckland City Council promotes the peer review process to its design consultants as a way to up-skill their staff and help them gain experience, rather than being an indictment on their work. The expected outcome is best practice facilities for road users in Auckland City.

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1. Introduction

The relatively limited number of experienced cycle facility designers in New Zealand means there is great value to be gained through the careful use of a peer review process. Auckland City Council (ACC) has recently identified innovative design solutions through the use of a technical peer review, which in turn assists inexperienced designers in future projects and raises the quality of all cycle projects in general.

To gain internal certainty and public acceptance, ACC needed to be assured that the numerous cycling projects underway represented best practice. ViaStrada Ltd (formerly called Traffix) was engaged to undertake a peer review of a group of cycling projects, and was able to achieve improved design quality and identify several innovative solutions to difficult design problems. Peer reviewing a number of projects collectively rather than individually is more cost-effective for a council, and the use of an independent peer reviewer reassures politicians and ratepayers that the best project is being developed – an important issue when there can be limited support for cycling projects.

ACC has a comprehensive programme of cycling schemes underway and many more are planned in the future. The objectives of the peer review process are to share knowledge across the industry, to upskill all parties involved, and create better outcomes for cyclists.

2. Methodology

ACC has a rolling programme of cycling projects, undertaken by various design consultants. At a point earlier this year, upon completion of several draft scheme plans, ViaStrada was invited to undertake a technical peer review. This included the following elements:

- Prior to coming to Auckland, the reviewer undertook a desk top review of the projects.
- The client (Daniel Newcombe) and the peer reviewer (Axel Wilke) then visited all sites together.
- At one site, the consultant's design engineer and a road safety staff member of ACC was also present.
- All sites were walked and driven through, and some sites were also experienced by cycle.

The peer reviewer then produced a written report, documenting the findings and recommendations for each project. The scope was not limited to simply commenting on the proposed design, but also any other changes that would improve the overall cycling environment. The client in turn used the report to work with the various consultants through the issues, and amendments have been made to the scheme plans.

There is an increased efficiency in doing one overall peer review for several projects at the same time, if they are all up to a similar level of draft design.

3. Projects

The following description outlines the peer reviewed projects, some of the initial issues and examples of the type of changes suggested.

Upgrade of Signalised T Intersection

The existing intersection is located on a key cycle route and is extremely difficult to negotiate. The existing design is substandard (not just for cyclists), deferred maintenance is evident, a very high proportion of heavy vehicles are present and there is no visibility for cyclists. The slip lanes are inadequate and the pedestrian provision is poor.

The original design (see Figure 1) sought to slightly upgrade the existing intersection arrangement with the addition of cycle lanes in some places. The designer obviously had difficulty finding sufficient space and managing the transition between on- and off-road cycle facilities.

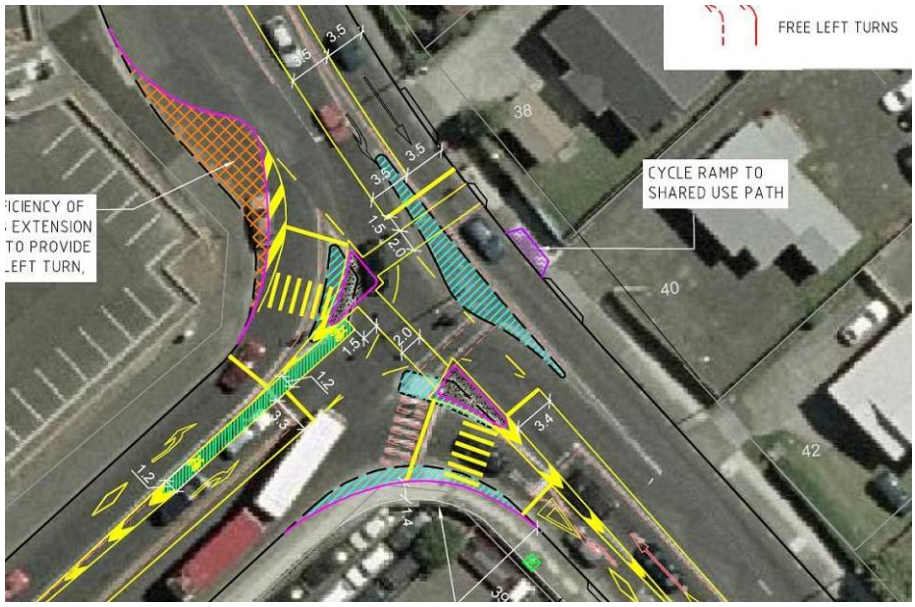

Figure 1: Original scheme plan

The peer review identified numerous omissions of potential cycle facilities, identified deficiencies in the current signal arrangement and recommended several additions to the design to greatly increase safety at the intersection, for pedestrians as well as cyclists (see Figure 2).

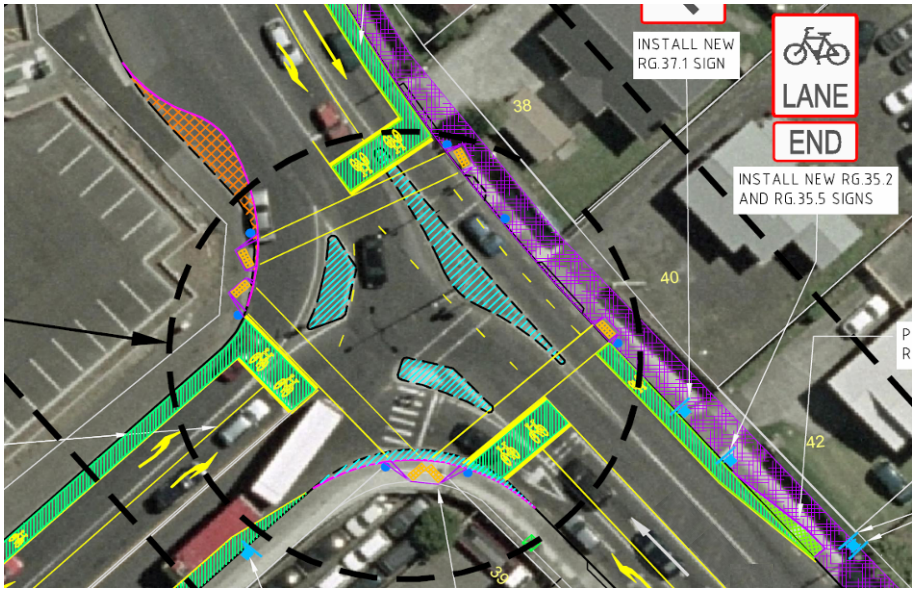

Figure 2: Revised scheme plan following the peer review process

This was an example of an engineer without cycling design experience trying to develop designs in a difficult environment, and the peer review was able to offer an alternative viewpoint. The project has subsequently been through an Urban Design review and further changes have been made along the lines of the peer review recommendations. The project is currently being safety audited and will progress to implementation soon.

Arterial Road Corridor Improvements

This long section of arterial road has mainly residential frontages and forms part of the core cycle network, achieving a link with one of the city's existing long-distance cycleways. There is an existing shared path along part of the route, but no specific cyclist provision along the remainder. For some sections cyclists have little choice but to ride on-road with the estimated 50,000 cars/day.

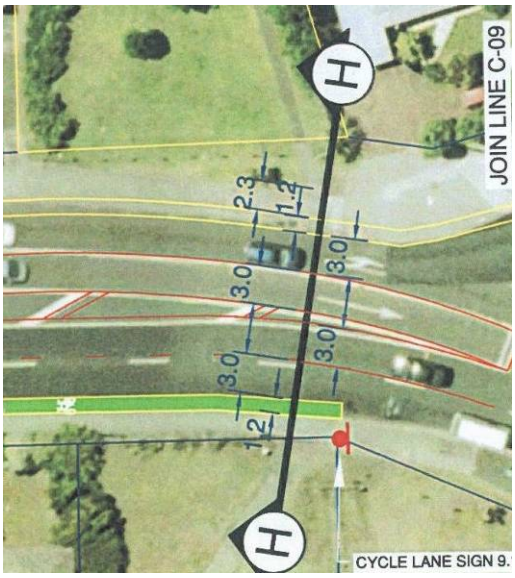

Figure 3: Old scheme with insufficient cycle lane widths

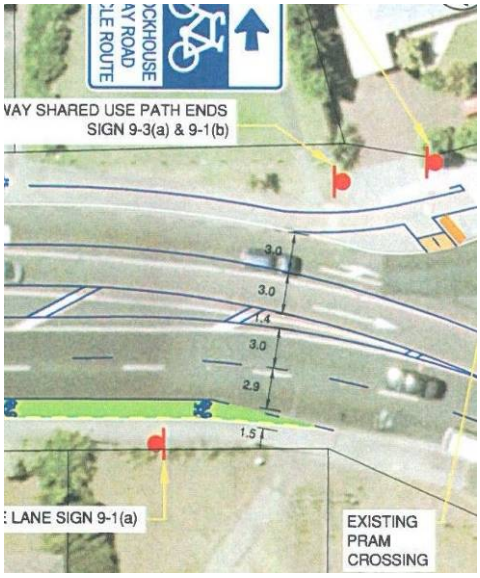

Figure 4: New scheme with cycle path following desire line through intersection

The peer review suggested an alternative signal phasing arrangement at a 5-arm signalised intersection, a different arrangement at a major T intersection (see Figure 3 and Figure 4), suggested numerous changes to the position of the proposed cycle lanes (see Figure 5 and Figure 6), and various improvements to the shared path section to improve safety.

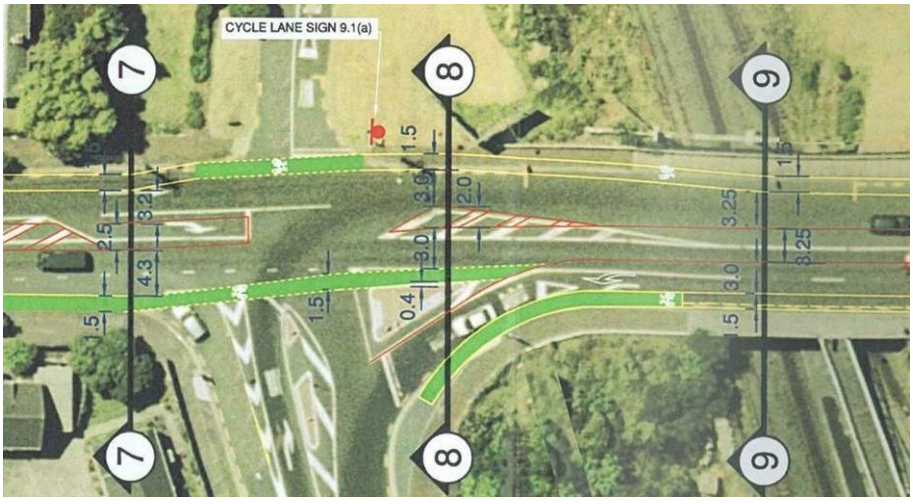

Figure 5: Discontinuous cycle lane across left turn slip lane in old scheme

This was an example of a project with a relatively inexperienced cycle designer, and the peer review offered both up to date technical inputs and additional options for consideration. The project is currently nearing detailed design.

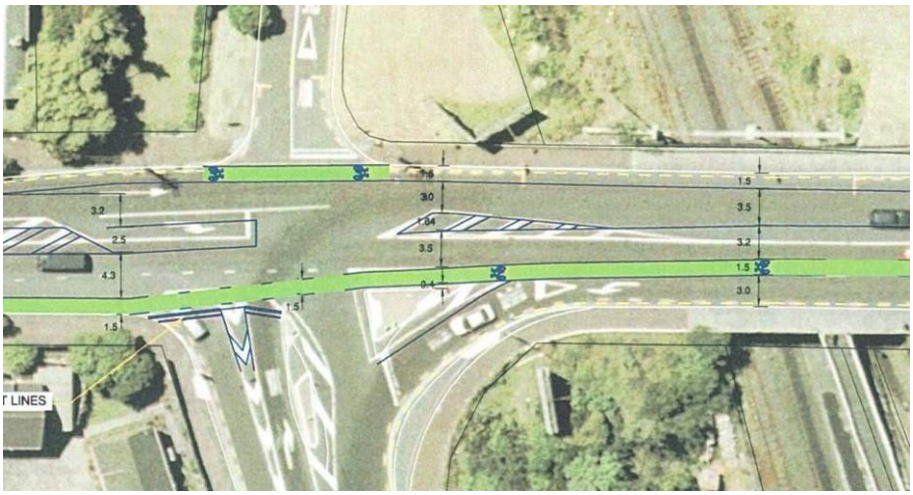

Figure 6: Continuous cycle lane across left turn slip lane in new scheme

Upgrade of Signalised Cross Intersection

This busy arterial intersection is being upgraded to improve safety and to increase capacity. There is an adjoining cycle lane on one arm of the intersection but no other cycle provision. The original scheme plan did little to improve the environment for cyclists (see Figure 7 for an example), with below standard width cycle lanes.

The peer review suggested reconsideration of the need for a capacity increase and suggested alternative arrangements. As road widening was occurring for the project regardless, a reallocation of lane width was suggested to achieve cycle lanes in compliance with the NZ guidelines (see Figure 8), i.e. the *Supplement to Austroads Part 14* (Transit NZ, 2004).

Figure 7: Old scheme – insufficient width of approach cycle lane

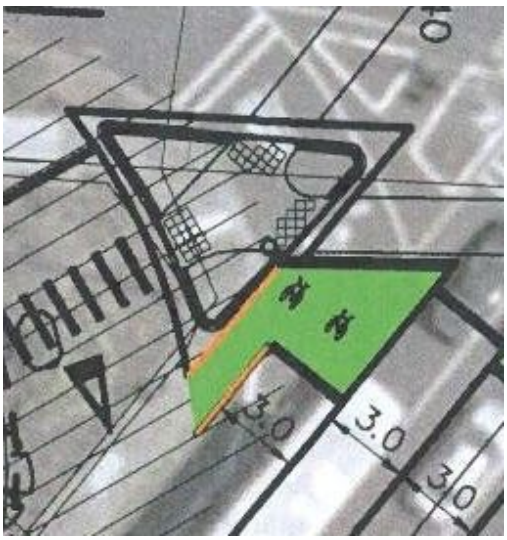

Figure 8: Revised scheme – reassigned lane dimensions

This was an example of an inexperienced cycle designer competing with numerous other interests in a complicated intersection project, and the peer review assisted in backing up the need and minimum standards for cycle provision. The project is currently at detailed design.

Corridor and Intersection Improvements No 1

This busy and complicated arterial road is a key CBD route, marking the start of one of the city's existing long distance cycleways, but the historical 'motorway-style' layout makes it difficult to provide for pedestrians or cyclists (see Figure 9).

Figure 9: Old scheme – no provision for cyclists on this steep, busy incline

The peer review suggested an innovative solution to the problem of finding room for a cycle lane on a steep uphill section by utilising an unused road shoulder adjacent to the motorway (see Figure 10). Other valuable suggestions were about improving the cycle lane design around a high speed flyover, and improvements to the transitions between off-and on-road parts of the cycle network.

This example represented a project that has been through several design revisions already, and benefited from the peer reviewer's independent assessment of the issues. The project is currently nearing consultation.

Corridor and Intersection Improvements No 2

The existing road design is unusual, as complex motorway onramps mix with local street connections, with minimal pedestrian and no cycle provision. This is despite the route's location adjacent to a major traffic generator and a large park area. The route forms part of a long distance cycle route, but can legally only be cycled in one direction due to the current unusual road layout.

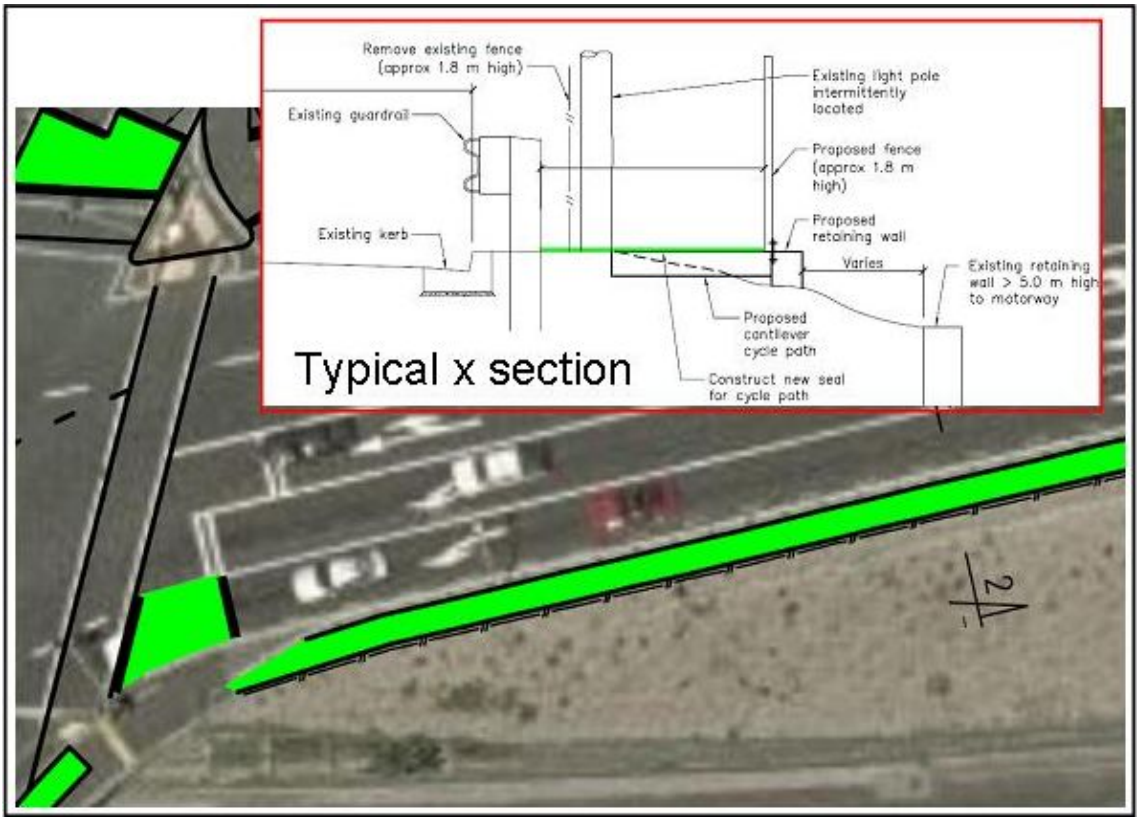

Figure 10: New scheme – pathway behind guard rail

ACC and Transit NZ have a desire to improve the situation, but the initial designs were either insufficiently different from the existing, encountered difficulties in trying to provide for all movements (such as safety concerns for cyclists entering or crossing high speed motorway offramp traffic), or resulted in convoluted routes (see Figure 11).

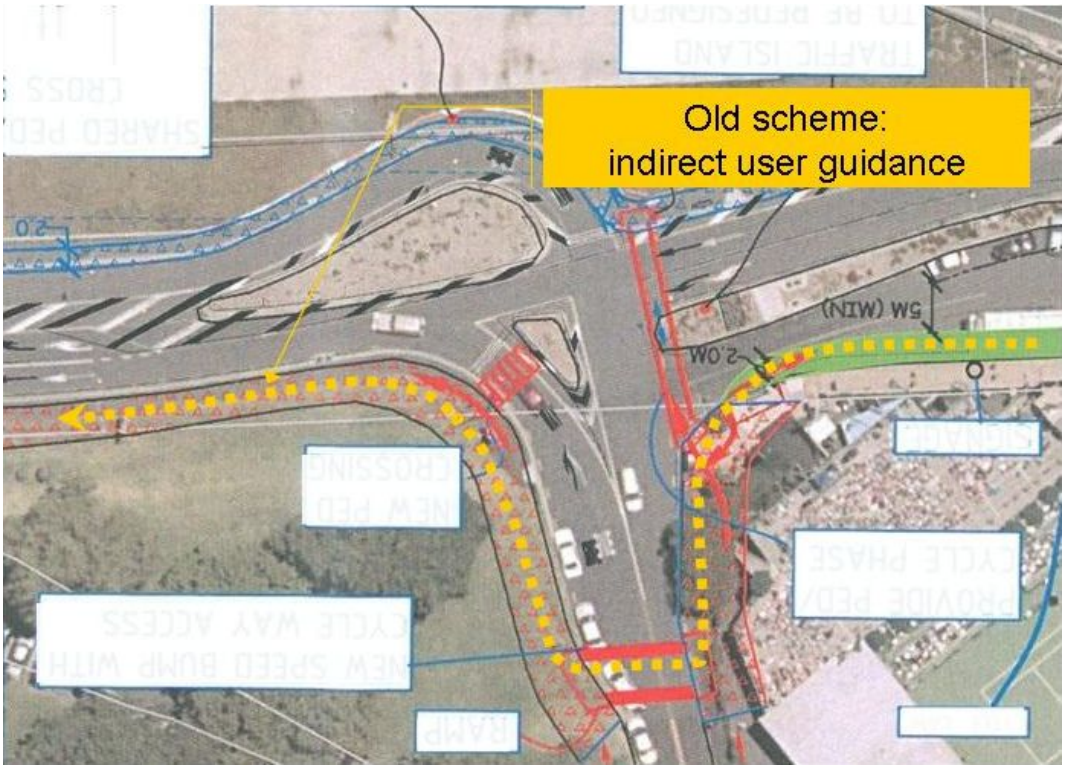

Figure 11: Old scheme – indirect user guidance

The peer review suggested additional safety measures where the proposed shared path crosses busy entrances, utilising unused grassed areas for cycle path shortcuts that match desire lines and numerous crossing improvements (see Figure 12) along the complex State Highway edge. It was suggested that the most practical solution is to emphasise an improved shared path (ramps, widths, etc) catering for the main desire line, and not attempting to provide for all movements, such as cyclists entering and interacting with high speed motorway offramp traffic.

This was an example of an inexperienced cycle designer struggling with a complex and unusual road environment. The peer review offered a greater understanding of how best to treat the area. The project is currently nearing consultation.

Figure 12: New scheme – guidance along desire lines

Cycle Lanes along Arterial Road

This controversial cycle lane project is located along a busy arterial road and forms a core part of the regional cycle network.

The peer review suggested minor changes to the cycle lane design to better meet current design standards in terms of marked symbol use and location. Although no major changes were recommended, this in itself was useful for ACC, as not finding major design faults at a late stage of the process gave the council confidence in the public consultation activities. The project is due for implementation later this year.

4. Discussion

The technical peer review process found many deficiencies with the original designs and resulted in much improved projects. The underlying reasons for the deficiencies are little or no cycling design experience, competing interests and complex projects which went beyond the expertise of the individuals involved.

An interesting parallel is the design of signalised intersections, where deficiencies are also reasonably common, as outlined in *Land Transport NZ (2006)*. Whilst

the underlying reasons for the design deficiencies at signalised intersections are quite different[1], the outcomes of reduced safety and a reduced Level of Service (LOS) for users are often the same.

The conclusions and recommendations in the 2006 Land Transport NZ document are equally valid here:

> *Engineers should make use of all the available relevant guidelines and standards*, and
>
> *The most important advice, however, is to engage a competent signal engineer for the peer review of new designs. Note that this is not covered by the road safety audit process..."*

By replacing the word "signal" with "cycle design", the last quote becomes most relevant to the issues discussed in this paper. As with traffic signals, the road safety audit process (Transfund NZ, 2004) cannot replace the role of a technical peer review if the fundamental design principles are not applied correctly in the first place.

The role of such a safety audit is not to redesign a plan, but merely to point out where proposals might fall short in terms of safety. Furthermore, cycle design can be as much of a specialised discipline as signal design, so that safety auditors may well be outside their area of expertise. And lastly, a safety audit does not concern itself with LOS issues.

Appropriate guidelines for cycling design are in place, with Austroads (1999) and Transit (2004) the main reference document. Those documents were often not applied and therefore the sharing of experience and getting different types of engineers talking to each other was a major objective in setting up the peer review process.

There may also be benefit in using a similar process with advocate groups if they too become involved in the design of cycling projects, in order to 'skill them up' with broader experience. Also, this peer review approach could apply to urban design consultants, as there is often a similar lack of experience or knowledge.

5. Conclusions

The use of a peer review process across a range of cycling projects achieved some positive outcomes for the council and the collective approach made more efficient use of resources. The outcome was greater than the sum of individual parts, had each project been individually peer reviewed at different stages.

Auckland City Council would recommend this approach as useful for any council where limited cycling design experience is available, either in-house or through consultants.

6. References

Austroads (1999). *Guide to traffic engineering practice: part 14, Bicycles* (2nd ed). Austroads, P.O. Box K659, Sydney, Australia.

[1] This is basically due to Councils having lost much of their in-house expertise by outsourcing engineering services across numerous consultants, resulting in the expertise being much more thinly spread.

Land Transport NZ (2006) *Stops and Goes of Traffic Signals: A Traffic Signal Auditors' Perspective.* Wellington (2006 revised edition)

Transfund NZ (2004) *Road Safety Audit Procedures for Projects: Guideline.* Wellington.

Transit NZ (2004). *New Zealand Supplement to Austroads Guide to Traffic Engineering Part 14: Bicycles*. Wellington.