Clarification to Discussion Section of Report (points 25 and 26)

At the Infrastructure and Regulatory Committee meeting on Tuesday 20 July officers provided clarification to statements 25 and 26 relating to the findings of Beca's independent safety audit carried out on 14 May as follows:

Officer's clarified that the Beca report concerns regarding visibility from side streets related only to the northern side, however their concerns about visibility at driveways related to both sides of the street within the trial.

Officers sought clarification from Beca who confirmed that the concerns as they related to the southern side (trial side) of the street were no greater than those experienced currently on the northern side.

HUTT CITY TE AWA KAIRANGI **Infrastructure and Regulatory Committee**

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Knights Road Connection Project: Post-Trial Recommendations

Purpose of Report

1. To enable the Committee to decide the next steps towards an interim and permanent layout on Knights Road that provides a safe connection for all modes of transport and incorporates information gathered during the trial process.

2. This report is informed by and presents a summary of the data, community feedback and safety audit information from both trials. It outlines the recommendations from the Project Control Group relating to the trial layout currently in place along Knights Road. Relevant reports are included for reference attached as Appendix 1 and Appendix 2 to the report.

Recommendations

That the Committee recommends that Council:

(1) notes and receives the report;

(2) agrees to the prioritisation of the programme of work associated with the connection of the Beltway Cycleway to Knights Road at Waterloo Station;

(3) agrees to formalising the changes to the layout in front of Waterloo Station and implementing the additional changes suggested in Beca's Safety Review attached as Appendix 2 to the report;

(4) endorses the implementation of the repairs and safety improvements recommended by Beca as soon as practicable along Knights Road;

(5) agrees that the trial layout currently in place on the south side of Knights Road between Waterloo Station and Willoughby Street be extended to Bloomfield Terrace and made permanent when practicable and that the installation of buffer islands be investigated;

(6) notes that the permanent works should be aligned with any services work required in the near future especially by Wellington Water Limited; and

(7) approves in principle the investigation and draft design of a complementary Eastbound route.

Background

3. In June 2020, Council was awarded funding from Waka Kotahi's Innovating Streets for People programme to work with the community to design a safer link from public and active transport facilities into Lower Hutt's central city. Knights Road was selected for this trial because it is a key connecting route between Waterloo Station, the new Beltway Cycleway and the central city.

4. The Knights Road Connection Project team developed a trial layout with the community and tested it in March 2021. During this process the scope of the trial was extended to include the intersection in front of Waterloo Station. Following community feedback and data analysis, officers amended the trial road layout and tested it with the community in May 2021. The scope was extended further to include the full corridor from the end of the Beltway Cycleway.

5. The goal was to test a road layout that delivers safer outcomes for all modes of transport without compromising function. This means safer speeds on the footpath and the road and improved perception of safety.

Discussion

6. The new layout on Knights Road (May 2021) has no impact on journey time and has not impacted services (bus, police, ambulance, rubbish collection and street sweeping). It has reduced queuing and we have safer speeds for west-bound traffic with no change to the volume of traffic. Independent safety reviews have identified no major concerns with the trial layout, but do identify concerns with the quality of the current linking corridor, particularly at intersections with side-streets and the surface of the footpath and carriageway.

7. A significant amount of work is required to address these concerns.

8. It is clear from the data and feedback received across this project and through the Long Term Plan process that there is an increasing demand in Lower Hutt for a safe and connected network that accommodates bikes, e-scooters and other faster wheels separate from the footpath.

9. A high-quality link along the corridor from the current end of the Beltway Cycleway past Waterloo Station and along Knights Road is critical to achieving a safe and connected network that enables travel choice. Officers recommend investing in this corridor to bring all sections of it up to a consistent standard of high quality connection.

10. The Northern and Central sections of the new Beltway Cycleway are already being well used but the lack of a quality connection to Knights Road has been flagged as a critical concern. Currently, people reaching the end of the Beltway are required to make a choice between travelling on-road along the busy Oxford Terrace through the roundabout, going 'off-road' along the narrow grass berm, or travelling through the Park n Ride carpark.

11. This introduces potential conflict between people using the Beltway Cycleway and vehicles on Oxford Terrace, or in the carpark.

12. Options for an interim 'boardwalk' solution that would provide a separated, direct connection from the end of Beltway to Waterloo Station were investigated but this proved not to be feasible. Therefore due to a clear demand, existing concern and lack of interim solutions, we recommend prioritising the permanent link.

13. The area in front of Waterloo Station is complex with heavy pedestrian traffic during peak times, a major bus hub and multiple turning movements at Birch Street, Pohutukawa Street and the corner of Knights Road and Oxford Terrace. During consultation in 2020, the community perceived the intersection in front of Waterloo Station to be the most dangerous part of Knights Road due to congestion, vehicle speeds and conflicts with pedestrians. As a result, the trial was extended to include speed calming measures in this area.

14. Data collected during the trials demonstrated that the speed calming measures worked well. Vehicle traffic volumes were unchanged, speeds were lower, turning movements were easier, pedestrian safety improved dramatically, safety for all modes of transport improved and journey times were relatively unchanged.

15. Therefore officers recommend making these speed calming measures permanent and upgrading the current, damaged pedestrian crossing on Pohutukawa Street with a raised table. This would replace the speed cushion on Pohutukawa Street, improve safety and clearly define priority at this crossing which is a key link for people travelling into Lower Hutt's City Centre.

16. The current level of service along the Knights Road corridor has been described as poor due to the condition of the road and footpath surface and the quality of intersections. The road layout at intersections encourages a high operating speed for turning vehicles. Repairs and upgrades to the surfaces, to the intersections and to the layouts were identified as necessary by Beca, outlined in the safety review and rough order costs have been prepared. The necessity for carrying out this significant work has been identified by independent safety reviews done in May and also raised by the public over the length of the project. This work includes;

    (a) improvements at the intersection crossings to provide walk-offs with tactiles that are suitable for users with prams, wheelchairs and vision impairment;

(b) changes to intersection layouts to reduce operating speeds;

(c) repair to the surface of both the footpath and the carriageway;

(d) safety improvements to pedestrian crossings;

(e) removal of all extraneous markings in the carriageway; and

(f) that in the interim, before these improvements can be made permanent, temporary solutions be implemented where possible, for example to narrow intersections using hit sticks.

Officers recommend that these repairs and upgrades should be programmed urgently whether or not the other recommendations in this report are approved.

17. From all of the collated information from the trials on Knights Road, the preferred solution would be an extended kerb layout, where there is defined space for pedestrians and for people on bikes and e-scooters. Unfortunately, rough order costs put that preferred solution out of range, at around $6.9M for the 1.1km. The total budget for the Cycling and Micro-mobility work programme over the next three years is $9.75million.

18. Therefore officers conclude that the next best option, that achieves safer speeds on the road and separation of modes without impacting on road function, is an extension of the current May 2021 layout in conjunction with the corridor and surface improvements outlined previously. A parallel facility for eastbound travel on a different street will be required to achieve the connected network needed to enable travel choice.

19. The data shows that the trial layout on Knights Road in May 2021 has achieved safer on-road speeds and improved mode separation for westbound traffic with no change to traffic volumes or journey times, and has not impacted on the function of the road for services.

20. During the March 2021 trial and the May 2021 trial officers collected community feedback through perception surveys. Officers received 209 surveys in May 2021 compared to 465 in March 2021. Officers also saw lower engagement on relevant social media pages and received fewer emails during the May 2021 trial.

21. Perception survey responses indicate that nearly half of the total respondents perceive the May 2021 layout has not improved safety for driving and overall the feedback on the perceptions of safety for people walking, biking or scootering is mixed. However, when looking at the perception of cyclists (those whose main mode of transport down Knights Road is biking) the picture differs: 59 percent agree safety has improved compared to the original layout.

22. Officers are seeing a continued increase in the number of cyclists for similar weather periods, from 500 in May 2018 to 1600 in May 2021. In March 2021, 2,480 riders were recorded by the Ecovisio counter.

23. Perception surveys are a useful way to gather data about a community's views as opposed to expert or official views and to collect data about issues that are intangible and difficult to measure. It is important to triangulate data gathered from perception surveys with other data. Therefore when early safety concerns were raised at the implementation of the May 2021 trial an independent safety audit of the trial layout, and safety review of the full corridor was carried out by Beca.

24. This review did not identify any significant safety concerns with the trial layout, although it suggested minor amendments, but it did identify concerns with the quality of the current corridor, particularly at the intersections with side-streets and the surface of the footpath and carriageway.

25. Key community concerns relating to the layout on Knights Road and to the trial area that were also raised in the Beca safety audit included:

    (a) that the facility only provides for safe travel in one direction by bike and other faster wheels,

    (b) the speed environment,

    (c) the quality of the road and footpath surface, and the intersections,

    (d) that there is not a clear, high-quality link between the end of the Beltway and Waterloo Station or Knights Road.

26. Community concerns from the perception surveys not shared by Beca were:

    (a) difficulty for vehicles pulling out of driveways and side streets on the south side (Beca raised concerns about this on the northern side, where the pre-trial layout is in place, but had none about the south side),

    (b) difficulty for parking a vehicle and accessing the footpath,

    (c) the fact that the median is narrowed and the perception that the traffic lanes were narrowed

27. Concerns about visibility and safety for vehicles pulling out of side streets, the speed environment and the quality of the road and footpath surface would be mitigated in the permanent layout recommended.

28. The current layout provides a separated facility for westbound traffic only. This was of concern to the community and to Beca.

29. Through the trials we have learned that there is insufficient space to provide a separated pathway for 'faster wheels' (bikes and e-scooters) in both directions and retain the on-street parking on both sides of the road unless an extended kerb solution is used.

30. Therefore to achieve the connected network that provides travel choice and supports using micro-mobility modes for daily journeys there needs to be a parallel facility on a different street to provide for travel in the opposite direction.

Options

31. The five options considered by the Project Control Group for the next steps of a layout on Knights Road are listed below, with rough order costs (ROC) provided by Beca. These costings are indicative only. All options include the estimates for the safety improvements recommended along the corridor:

    (a) An extended kerb layout - (ROC=$6,974,000);
    Ideally the extended kerb would provide a two-way facility for people on bikes and e-scooters on the south side of Knights Road. This would link well to the Beltway, through to the RiverLink designs and on to the CBD. From the research and engagement done through the trials this is the design that would address many of the concerns with the current layout as well as with the road in general and that would provide the best separation of 'faster wheels' from both pedestrians and motor vehicles. It is also the option most likely to be perceived as safe and the treatments required at intersections are similar to that already required. However this would require significant engineering and rough order costings put this option at $6,974,000. This figure is indicative and contains a 30% contingency due to the scope and number of unknowns.

    (b) Retain and extend the trial layout to Bloomfield Terrace (ROC=$384,000);
    This would involve extending the layout using only the paint and materials currently in place. The parked cars and the one meter buffer zone would continue to provide 3.5m of separation between people on bikes and e-scooters and moving traffic on the carriageway but there would be no physical separation between the parked cars and shared pathway. This option would provide a one-way connection to the Beltway Cycleway and Waterloo Station while allocating road space to people on bikes and e-scooters.

    (c) Retain and extend the trial layout to Bloomfield Terrace with the addition of physical buffers similar to those used in Dunedin and Rongotai between the shared path facility and the parked cars (ROC=$589,000);
    As with option (b) above with the addition of concrete island buffers will help to delineate the car parking spaces and will provide an edge-line for vehicle parking. It would require a mini-sweeper to be purchased to enable road sweeping.

    (d) Amend the trial layout to a one-way painted pathway on the south side outside of the parked cars as per the March 2021 trial northern side layout and implement the safety amendments (no formal ROC for this option, but likely to be between $390,000 and $500,000);
    This option would provide a one-way connection to the Beltway Cycleway and Waterloo Station while allocating road space to people on bikes and e-scooters. It would return parking to be against the kerb and would allow the median to be widened slightly but it would not provide the separation of modes of transport identified as important to less confident riders. An eastbound facility on another road would still be required to complete the connection

    (e) Remove the trial layout but implement the safety amendments. (ROC=$393,000)

    This option would improve the quality of the road corridor but would not contribute to the goal of a safe, connected active mode network across Lower Hutt for access to schools, workplaces and leisure activities.

32. The Project Control Group support option C as the most cost-effective way to improve micro-mobility safety and connectivity within this section of Lower Hutt.

Climate Change Impact and Considerations

33. Significant investment is happening in Lower Hutt and the Wellington region in off-road cycleways and shared paths. Once in place, these will be used and perceived as safe. This is an important part of reducing congestion, improving health, and reducing the carbon impact of travel. However, for people to see these facilities as a viable alternative for making their daily journeys to school or work and for leisure, a connected network to the places people want to access is needed. This requires on-road connections that are perceived as safe.

34. Knights Road connects Waterloo Station and the Beltway Cycleway to Lower Hutt's central city and passes several local schools. It is therefore one of the key routes in Lower Hutt requiring a safe on-road connection.

35. This aligns to the GPS 2021 for transport, to Wellington's Regional Land Transport Plan and to Council's climate emergency declaration, which identifies 56% of our city's emissions as coming from transportation.

Consultation

36. The original decision to apply for funding to trial layouts on Knights Road was based on existing Council strategies and a previous micro mobility study undertaken with key stakeholders.

37. Throughout the trial process there has been extensive engagement online and face-to-face with residents, businesses, local schools, advocacy groups and commuters.

38. Officers dedicated a project team member to liaise with the many businesses located in and around the trial area. Officers also dedicated a team member to liaise with interested schools (about 2000 students attend schools on or adjacent to Knights Road).

39. Officers delivered project communications to residents in and around the trial area on a regular basis throughout the trials. This included advance notice of when the trials would be installed; information about how to provide feedback; and invitations to community and resident-specific events.

40. An e-newsletter kept subscribers up to date in real time about the trial, community events related to it, and how to provide feedback.

41. The main social media channel was Facebook. Officers used this channel to share information about the trial, invite feedback, and highlight any issues as they emerged (eg informing of delays in installation because of weather). Officers amplified their voice in this space by boosting posts and sharing them to Council's Facebook page and other relevant community pages.

42. Officers utilised local print media, particularly during the amended trial, to amplify messages around the need and demand for connectivity for active modes of transport in Lower Hutt; the community participation in the trials; the themes of community feedback; and a call-to-action to the community to let us know their experiences of the trial.

Legal Considerations

43. Depending on the decision, the appropriate processes will be followed to comply with all legal requirements.

Financial Considerations

44. Waka Kotahi NZTA committed to funding 90% of this project which had a total budget of $558,325. However, they have since taken responsibility for all expenditure incurred on this project up until 30 June 2021. Consequently, Council has carried over the $55,833 that was our 10% contribution which will be used to action the decisions made for next steps.

45. Additional funding at 51% FAR is available from Waka Kotahi to action these decisions.

46. Officers hold budget in the Cycling and Micro-mobility work programme that could be used to action decisions.

Appendices

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2	Appendix 2: Beca Safety Review and Audit	41

Author: Aileen Campbell
Road Safety Coordinator

Reviewed By: Charles Agate
Traffic Engineer - Network Operations

Approved By: John Gloag
Head of Transport

Knights Road Connection Project

June 2021



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1. Summary and conclusions

In June 2020, Hutt City Council was awarded funding from Waka Kotahi's Innovating Streets for People programme, to work with the community to design a safer link from public and active transport facilities into Lower Hutt's central city. Knights Road was selected for this trial because it is a key connecting route between Waterloo Station, the new Beltway cycle route and the central city.

We developed a trial layout with the community and tested it in March 2021. During this process the scope of the trial was extended to include the intersection in front of Waterloo Station. Following community feedback and data analysis, we amended the trial and tested it with the community in May 2021. The scope was extended further to include the full corridor from the end of the Beltway Cycleway. Beca Engineering conducted an independent safety audit of this amended trial after early concerns were raised by members of the local community, and Waka Kotahi's Principal Multi-Modal Advisor also reviewed the trial layout.

This report presents a summary of the data, community feedback and safety audit information for both trials. It makes recommendations for addressing safety issues and presents options for next steps.

Conclusions: data and feedback on Knights Road layout (May 2021)

The goal was to test a road layout that delivers safer outcomes for all modes of transport without compromising function. This means safer speeds on the footpath and the road and improved perception of safety.

The layout changes at the intersection in front of Waterloo Station made in the March trial which remained in place during May continue to show improvements in safety for all users, especially pedestrians, no impact on road function for services and overall an improvement in journey efficiency.

The new layout on Knights Road (May 2021) has no impact on journey time and has not impacted services (bus, police, ambulance, rubbish collection, street sweeping). It has reduced queuing, and we have safer speeds on west-bound traffic. We are seeing a continued increase in the number of cyclists for similar weather periods, from 500 in May 2018 to 1600 in May 2021. Independent safety reviews have no major concerns about the trial layout.

For the May trial 209 surveys were returned by members of the community compared with 465 for the March trial. We also saw lower engagement on relevant social media pages and received fewer emails during the May trial.

The survey responses indicate that nearly half of the total respondents, residents and the general public perceive the May layout has not improved safety for driving. Overall the feedback on the perceptions of safety for people walking, biking or scootering is mixed, but most disagree that safety has been improved.

However, when looking at the perceptions of cyclists (those whose main mode of transport down Knights Road is biking) the picture differs slightly: 40 percent feel that the May layout has improved the safety for biking compared to the previous trial and 59 percent agree safety has improved compared to the original layout. Key community concerns about the layout on Knights Road are:

- visibility and safety for vehicles pulling out of driveways and side-streets on the south side
- the fact that the median is narrowed and the perception that the traffic lanes were narrowed[1]
- concern that the facility only provides for safe travel in one direction by bike and other faster wheels.

Key community concerns relating to the project corridor from the end of the Beltway to the intersection with Bloomfield Terrace in general are:

- the speed environment
- the quality of the road and footpath surface, and the intersections
- there isn't a clear, high-quality link between the end of the Beltway and Waterloo Station or Knights Road. These concerns are also raised in Beca's independent safety review and in other community engagement across this project.

The review by Beca in May and feedback from the community over the 12 months of the project is that the current level of service on Knights Road for people walking, using scooters, bikes and mobility scooters is poor due to surface conditions on the footpath and the road, and poor quality crossings at intersections with side streets which encourage high speeds. This contributes to overall safety concerns. A significant amount of work is required to address these concerns.

It is clear from the data and feedback received across this project that there is an increasing demand in Lower Hutt for a safe and connected network that enables bikes, e-scooters and other faster wheels separate from the footpath.

The layout trialed in May has achieved safer speeds and increased separation for people on bikes, e-scooters and other faster wheels. It is also seen by cyclists as being safer than the original layout. However, the litmus test question – does the new layout make it safe enough for my child/grandchild to ride/scoot to school? – is still a 'no' from the wider community.

Therefore we conclude that a high-quality link along the corridor from the current end of the Beltway Cycleway past Waterloo Station and along Knights Road is critical to achieving a safe and connected network that enables travel choice. We recommend investing in this corridor to bring all sections of it up to a consistent standard of high quality connection. Detailed recommendations about the work required at each section to achieve this are in sections 3, 4, 5, 6, 7 and 8 of this report.

[1] The traffic lanes remained the same width in the May trial as they were in March, but feedback showed people perceived them to be narrower. The median was narrowed to 1.5 metres.

2. Introduction

This report provides an analysis and summary of feedback and data collected during March and May 2021 in relation to the Knights Road Connection Project while trial layouts were in place on Knights Road. The intent of the trials was to test a layout that could provide a safer connection from the Beltway cycleway and Waterloo station to Lower Hutt's central city. A video of the connection in its current state can be seen here. This report also provides options for next steps now that the trials are completed.



Figure 1: Area of the Knights Road Connection Project

Background

In June 2020, Hutt City Council was awarded funding from Waka Kotahi's Innovating Streets for People programme, to work with the community to design a safer link from public and active transport facilities into Lower Hutt's central city. Knights Road was selected for the site of this trial because it is a key connecting route between Waterloo Station, the new Beltway cycle route and the central city, and was the selected route during a previous micromobility study done with the community in late 2018.

During initial engagement (June-September 2020), the scope extended to include the intersection in front of Waterloo Station because this was a major area of safety concern and needed to be addressed to provide a safe connection. In March 2021 we trialled a new road layout outside Waterloo Station and along Knights Road between Waterloo Station and Willoughby Street. We installed a pop-up park at Birch Street to provide a 'home' for the project as well as seating, art and native plants.

The outcomes of this trial were that an amended trial would be put in place with these features:

- the trial layout would stay in place at the Waterloo Station intersection
- the pop-up park would remain after the end of the project (June 2021)
- an amended layout would be trialled on the same section of Knights Road.
- the scope of the trial was extended to link to the end of the soon-to-be-opened Beltway Cycleway (area shown in figure 1).

We implemented this amended layout and it was in place during May 2021. Options for better connections to the Beltway were explored that same month.

This trial is part of a national programme supported by Waka Kotahi NZ Transport Agency. It helps councils and communities work together to rapidly design and test temporary changes that enable more people to choose active and public transport. The Knights Road Connection project is funded 90% by Waka Kotahi and 10% by Hutt City.

Purpose of the trial

The purpose of the trials were to test layouts intended to make the journey a safer, well-used and more attractive connection.

In New Zealand, there is a growing demand for 'micromobility' devices ('faster wheels' such as e-bikes, e-scooters and e-longboards, mobility scooters, push scooters etc), and a national commitment to reducing the carbon footprint of travel by increasing the proportion of journeys made by public and active modes of transport.

Significant investment is happening in Lower Hutt and the Wellington region in off-road cycleways and shared paths. Once in place, these are well used and seen as safe. However, for people to see these facilities as a viable alternative way to make some of their daily journeys to school or work and for leisure, they need to form a connected network that links to the places people need and want to go. This requires on-road connections that are seen to be safe.

Knights Road connects Waterloo Station and the Beltway cycleway into Lower Hutt's central city and passes several local schools. It is therefore one of the key sites in Lower Hutt requiring an on-road connection that is seen to be safe. A layout that works here can be extended on this key route, and applied to other key connections in Lower Hutt to create a connected network of cycleways, shared paths, and on-road connections between them and people's desired destinations.

Throughout the trial we worked with the community to find a safer layout for all modes of transport. Children on bikes, people on e-scooters and people walking on the footpath should feel safe using this key connecting route, while keeping the road functioning well for other users.

Within the trial context, we may only use temporary materials and we need to comply with the safety regulations for a 50 kilometres per hour speed environment. This meant that while layouts could be tested, we were not able to address some other safety issues raised such as uneven surfaces and were limited in what could be done on the footpath.

What outcomes did we want to achieve?

We wanted to achieve two outcomes from the trial:

The road layout is safer for all users

We wanted to see safer speeds on the footpath and on the road, more separation for people using different modes of transport and as a result improved perceptions of the safety of their journeys for all users of Knights Road.

The road layout continues to function efficiently

We wanted to make sure the safety improvements did not come at the cost of the road functioning well for all users including those travelling the route, local residents and services such as public transport, rubbish collection and street sweeping. The emphasis was on improving safety and reallocating space for active modes of transport without compromising function. A road layout that achieves these outcomes could then be applied on key routes to connect the network of cycleways and shared pathways in Lower Hutt to each other and to the places people need to go.

3. Independent safety audits

Independent safety audits conducted by Beca Engineering in May 2021 highlighted a range of issues with the Knights Road corridor in general, and some issues with intersections and pedestrian crossings in particular. They did not highlight any major concerns with the trial layout itself, but did flag areas of concern also raised by the community that were outside of the scope of the trials as they require permanent work to be done.

While only some of these matters relate directly to the trial area, all of them impact the general safety of road users particularly those using active modes of transport. An example is the quality of the road surface, particularly at intersections, along Knights Road.

The Beca safety audits have been sent as reference material supporting this report. Specific issues relating to intersections and pedestrian crossings are in sections 4, 5, 6 and 7 of this report.

General safety issues raised in Beca safety audit:

Speed is an issue in general, but particularly at the pedestrian crossings, eastern lane and wide side road approaches to Knights Road which encourage high approach speeds and increase the crossing distance for pedestrians.

Throughout Knights Road there are footpath ramps at intersections and at pedestrian crossings that are of a poor quality because of poor pavement condition and/or steep gradients along with a lack of tactile pavers. This creates a trip hazard to all users, and is particularly problematic for users in wheelchairs, mobility scooters or who are visually impaired.





Poor visibility at several of these intersections and the long crossing distances due to the wide roads compounds the risk of injuries or conflicts. The footpath and the road surface quality are poor, creating trip hazards. A site visit and walk-through with Living Streets Aotearoa and disability advocates also flagged these same concerns and the difficulties and dangers they present.

Recommendation 1: Safety improvements

That regardless of which layout option for Knights Road is chosen, the repairs and safety improvements recommended by Beca are implemented as soon as practicable to provide a safe and good-quality corridor connection for all users. These are improvements at the intersection crossings to provide a slope that is suitable for prams and wheelchairs, tactiles, and changes to intersection layouts to reduce speeds. Also repairs to the surface of both the footpath and the seal, and removal of all extraneous markings. This is significant work, but needs to be done and has been identified by safety reviews and the public. This should be aligned with any services work required in the near future, especially by Wellington Water.

Repairs and safety improvements from Beca safety audits:

The operating speed in Knights Road should be reduced to 40 kilometres an hour and speeds at side road intersections should be reduced through traffic calming measures such as narrowing intersections, improving sightlines and adding raised safety platforms.

The area from the Oxford Terrace roundabout through to the beginning of Knights Road past the busy Waterloo Station should be a slower operating speed area.

Footpaths connecting Waterloo Station to Lower Hutt's CBD should be of a consistent good quality for all users. Tactile pavers should be provided where needed and pedestrian ramps at crossings should be smooth and gradual as in the image (right) from Colin Grove.



The current level of service is poor, and the road layout at intersections encourages a high operating speed for turning vehicles.

Intersections should be improved to a good standard of service for all users and safety improvements are needed to narrow crossing distances and improve protection for pedestrians.

Seal repairs to the road surface are needed, and safety improvements are needed at the pedestrian crossings of Pohutukawa St, Bloomfield Terrace, and by Chilton St James School.

4. Beltway to Waterloo intersection

The Beltway Cycleway is a new off-road cycleway that will become a key part of the network of off-road cycleways and shared paths which will provide transport choice to residents of Lower Hutt. The first section links the northern car park at Waterloo Station to the Hutt River Trail at Taita Drive. This is being formally opened at the end of June 2021 and is already being well-used by people who do not fit the category of existing and confident cyclists – e.g. families, people with mobility issues, people on scooters etc.



The next phase of the Beltway Cycleway will continue this high standard facility past Waterloo Station and further south, following the rail corridor. However, in the interim, people reaching the end of the Beltway are required to make a choice between travelling on-road along the busy Oxford Terrace through the roundabout, going 'off-road' along the narrow grass berm, or travelling through the Park n Ride carpark and then using the footpath outside Waterloo Station.

This introduces potential conflict between people using the Beltway Cycleway and vehicles on Oxford Terrace or in the carpark.

Linking the Beltway to Waterloo

Community feedback during the first trial in March 2021 called for better connectivity between the Beltway, Waterloo Station and onwards along Knights Road to the central city. Community feedback in May, with the Beltway so near completion, was even stronger on this point, flagging the current link as confusing, unclear, fragmented and unsafe.

The safety review completed by Beca during May also flagged this lack of connection as a key issue of concern, compounded by the layout of the Oxford Terrace roundabout which enables relatively high speeds, and the lack of dedicated pedestrian facilities to access the car park located on the west side of Oxford Terrace.



Beca stated that the footpath connection is not clear, which limits pedestrian accessibility in the area and encourages pedestrians to cross at locations where vehicles may not expect them.

We investigated options for an interim solution that would provide a separated, direct connection from the end of Beltway to Waterloo Station. The most practical option seemed to be a boardwalk connection, overlying the grass berm and

narrowing the wide roads. Our investigations conclude this is not a feasible solution because:

- the cost would be prohibitive, at approximately $180,000 – too high for an 18-month interim solution covering just 80 metres
- site logistics would mean the temporary boardwalk would be too narrow to be two-way facility shared by people on foot, on scooters and on bikes and would not extend all the way from the Beltway to the station
- the components would not be able to be repurposed at the end of the trial.

Recommendation 2: Prioritise this link

Investigation of a temporary better link to the Beltway have shown the boardwalk solution to be not cost-effective. Therefore we recommend that the next phase of the Beltway be programmed as soon as possible. The interim link through the Park n Ride carpark or on Oxford Terrace is not viewed to be safe or clear by Beca or users, particularly the less confident and slower users the Beltway is otherwise ideal for. We also recommend adding additional wayfinding signage in the interim to improve clarity.

Recommendations

- when the next phase of the Beltway commences, programme this connection as early as possible in the construction
- as part of the next phase of Beltway, consider implementing the increased deflection at the Oxford Terrace Roundabout to slow left turning vehicles in order to improve pedestrian and vehicle safety or alternatively, consider signalising this intersection
- investigate whether temporary kerb build-outs would improve this in the short term
- in the interim, make long-term temporary (2 years life) wayfinding improvements from the end of the Beltway through Waterloo Station car park to Waterloo intersection (e.g. sharrows, more permanent signage and pavement decals)

5. Waterloo intersection

Relevance of the intersection to the key outcomes

During community consultation in 2020, the community perceived the intersections in front of Waterloo Station to be the most dangerous part of Knights Road. People were concerned about congestion, vehicle speeds and conflicts with pedestrians. As a result, the trial was extended to include changes to this area.

Changes that were implemented

For the first trial layout in March we installed speed cushions to reduce approach speeds, highlighted pedestrian crossings through red colouring, and installed green flexiposts to improve left turning movements. A pop-up park was installed at Birch Street to provide a 'home' for the project as well as seating, art and native plants.





Key results of community feedback and data analysis in first trial (March 2021)

Overall during the first trial period:

- vehicle traffic volumes were unchanged
- Speeds through this intersection were lower
- turning movements were easier
- pedestrian safety improved dramatically[2]
- safety for all modes improved[3]
- vehicle traffic volumes were unchanged
- journey times were relatively unchanged

[2] Analysis of video footage taken by drone at the busy times of 8am-9am and 3pm-4pm showed that compared to baseline footage taken in October and November 2020 there was 75.3% reduction in near-miss incidents for pedestrians by volume and a 7.7% reduction in conflict speed. Fewer near-misses happened at lower speeds

[3] Analysis of video footage taken by drone at the busy times of 8am-9am and 3pm-4pm showed that compared to baseline footage taken in October and November 2020 there was 29.2% reduction in near-miss incidents for all road users by volume and a 23.7% reduction in intersection approach speed. Fewer near-misses happened at lower speeds

- the pop-up park was popular, majority wanted it to stay in place beyond June 2021

The changes remained in place for the amended trial in May 2021, with minor alterations to the colour of flexiposts. We collected additional data and feedback during that time to see whether the results observed in March remained consistent over a longer period with the changing seasons.

Key results in amended trial (May 2021)

Overall during the second trial period:

- changes we saw during the March trial persisted (Mooven and Beca data)
- queuing on Oxford Terrace southbound was reduced compared to phase 1 trials
- there was little change across trials on average journey times on Pohutukawa Rd & Oxford Terrace

Note: During the May trial, a pedestrian was struck by a car at the Waterloo Station near the pedestrian crossing when they failed to see the oncoming vehicle. (Reportedly they were neither at the crossing nor looking for traffic). According to police, the traffic-calming measures put in place for the trial were likely a major factor in this incident not resulting in any injuries. This incident would likely have resulted in more serious injuries if it had occurred in the pre-trial layout because of the higher vehicle speeds at this intersection at that time.

Knights Road/Pohutukawa Street intersection

At the Pohutakawa pedestrian crossing there are damaged pavement surfaces (Pohutukawa St) and, as this is the key link for people travelling into Lower Hutt's central city, changes could be made to improve safety and clearly define priority





here.

Recommendation 3

The changes to the layout in front of Waterloo Station are made permanent, with the additional changes suggested in Beca's safety review. This would involve:

- retain trial layout of reddened crossings and speed cushions on Oxford Terrace and Knights Road
- consider adding flexiposts at the corner of Knights and Oxford as some vehicles are now swerving to avoid the speed cushion
- combine the cyclist and pedestrian crossing of Pohutukawa Street on a raised table to slow vehicle speeds, and clearly define who has priority. This would provide a better link for people on bikes and e-scooters to/from the Beltway cycleway, and would meant that the speed cushion on Pohutukawa Street could be removed
- remove the redundant street furniture (island pictured above)on Knights Rd to discourage jay walking
- consider this section and the area through to the Oxford Terrace roundabout becoming a lower speed zone.

6. Trial layout on Knights Road

During community consultation in 2020, the community voiced concerns about speeding; high volumes of traffic; and perceptions that people on foot and bikes, scooters and e-scooters were unsafe travelling on Knights Road. We developed a trial layout for Knights Road aiming to provide a connection that addressed these concerns.

First trial (March 2021)

The first trial layout was in place on Knights Road, from Willoughby Street to Waterloo Station, from Friday 26 February until Monday 29 March 2021.





The layout included:

- speed cushions and signage to encourage slower speeds around the Waterloo intersection
- two temporary lanes for bikes and e-scooters marked with paint and delineators, different types of delineators on each side of the road
- reduced parking on the south side of Knights Road to create the space for these two temporary pathways
- median strip retained to allow for turning vehicles into streets and driveways.

During the trial, we gathered data and feedback to measure how the trial layout performed against the outcomes we wanted to achieve.

Key results of community feedback and data analysis: March trial

Overall during the trial period:

- vehicle traffic volumes were unchanged
- more people cycled
- extreme speeding decreased, and average speeds remained unchanged
- journey times improved, for most journeys
- most people did not perceive pedestrian and vehicle safety improved as a result of the trial

We also found that the functioning of Knights Road was compromised for residents' parking, street sweeping and, on the north side initially, for rubbish collection - but not for public transport and emergency services.

The main themes of feedback from the community were:

- support for a separated pathway to provide a safe space for people on faster wheels such as bikes and e-scooters, away from the footpath and more separated from the traffic
- the level of parking loss was unacceptable

Amended Layout

The requirements of the above feedback and the national regulations meant there was only space for a one-way separated pathway for people on bikes and e-scooters and so the north side of the trial was returned to baseline. The purpose of the amended trial remained the same - to test a road layout that delivers safer outcomes for all modes of transport without compromising function. The learnings can then be applied to the network of key connections across Lower Hutt.



The trial layout was amended in May to:

- return parking to both sides of the road
- retain the median strip, though it was narrowed to 1.5m
- provide better separation between moving traffic and the pathway for bikes and e-scooters

Immediately post-implementation, community concerns were raised about safety of the layout in general and the visibility of parked vehicles and for vehicles exiting side-streets and driveways in particular, so an independent safety audit of the temporary layout was completed urgently by Beca, followed by a safety review of the corridor from the Beltway cycleway to Bloomfield Terrace.

Findings from Safety Audit and Review

The Beca safety audits identified no serious concerns with the layout of the separated pathway in the amended trial, although they did identify a number of possible improvements.

They identified concerns with the layout on the north side of the road, which had been returned to the pre-trial layout. Visibility at side streets and driveways on the northern side and there being no dedicated facility for people on bikes travelling to

Waterloo Station were two of their main concerns, and part of the reason for their recommendation to lower the speed environment in Knights Road.

Finally, they identified the surface condition of the road, the footpaths and the intersections as being poor quality and recommended repairs and upgrades to provide a consistent standard of high quality connection along the length of Knights Road.

7. Data from the May Trial

Conclusions on data and feedback about Layout on Knights Road: May trial

The goal was to test a road layout that delivers safer outcomes for all modes of transport without compromising function. This means safer speeds on the footpath and the road, and improved perception of safety.

The new layout has no impact on journey time and has not impacted services (bus, police, ambulance, rubbish collection, street sweeping). It has improved queuing, and we have safer speeds on west-bound traffic. We are seeing a continued increase in the number of cyclists for similar weather periods, from 500 to 1,600 comparing May 2018 to May 2021. Independent safety reviews have no major concerns about the trial layout.

Just over 200 responses were received to the three surveys made available; residents, school and general public. There was also lower engagement on relevant social media pages and fewer emails received. The survey responses indicate that nearly half of the total respondents, residents and the general public perceive the May layout has not improved safety for driving. Overall the feedback on the perceptions of safety for people walking, biking or scootering is mixed, but most disagree that safety has been improved.

However, when looking at the perceptions of cyclists (those whose main mode of transport down Knights Road is biking) the picture differs slightly: 40 percent feel that the May layout has improved the safety for biking compared to the previous trial and 59 percent agree safety has improved compared to the original layout.

From the feedback responses received, key concerns are visibility and safety pulling out of driveways and side-streets (worth noting that Beca's review identifies this as being of concern on the north side (original layout, but not the south side), the fact that the median is narrowed and perception that the traffic lanes have been narrowed compared to the March layout, and concern that the facility only provides for safe travel in one direction by bike. Key concerns related to the road in general are the surface of the road and footpaths, and speed. The connection from the Beltway is poor and unclear.

It is clear from the data and feedback received across this project that there is an increasing demand in Lower Hutt for micromobility modes of transport and that riding on the road is seen to be too dangerous for people who are not existing and

confident riders. Feedback on the Beltway facility and the Wainuiomata shared path, and data on usage, shows that there is latent demand to use these modes of transport, and for a safe and connected network.

Both the review by Beca and the feedback from the community is that the current level of service on Knights Road for people walking, using scooters, bikes, or mobility scooters is poor due to surface conditions on the footpath and the road, and to poor quality crossings at intersections with side streets. This contributes to the perception of safety as well. A significant amount of work is required to address these service concerns.

The second trial layout has achieved safer speeds and increased separation for people on bikes and e-scooters. However, the litmus test question – is it seen to be safe enough for my child/grandchild to ride/scoot to school? – is still a no from the wider community.

Therefore, we recommend that Hutt City Council and NZTA consider implementing as the permanent solution an extended kerb design that would provide a separated two-way facility for people on bikes, e-scooters and faster wheels on Knights Road for the 1.1km between Waterloo Station and Bloomfield Terrace.

This will eventually link the Beltway to the slower speed area proposed by the RiverLink development programme, and to the Melling to Petone and Ngauranga routes. This would be the design most acceptable to the community and most likely to get 'faster wheels' away from pedestrians and off the road, as well as providing a facility parents feel comfortable with their children using. It would provide a future-proofed, consistent, clear, quality connection. It would also avoid some complications with rubbish collection and road sweeping that would arise with a more permanent version of the current layout if buffer islands were added.

8. Options for a permanent connection

Recommendation 4: Investigate a best-practice extended kerb design

Hutt City Council and NZTA consider implementing as the permanent solution an extended kerb design on one side of Knights Road that would provide a separated two-way facility for people on bikes, e-scooters and faster wheels on Knights Road for the 1.1km between Waterloo Station and Bloomfield Terrace. We are suggesting a design similar to the left hand image below, but with a 2-way facility for bikes/e-scooters. This is because this would involve the kerb and channel on only one side of the road, for a total of 1.1km, rather than having a one-directional facility on two roads. It would also be a design that would work best for rubbish collection and street sweeping services. We do not believe there is enough space to have a 2-way facility on both sides of the road on Knights Road, and retain parking on both sides and the median strip.



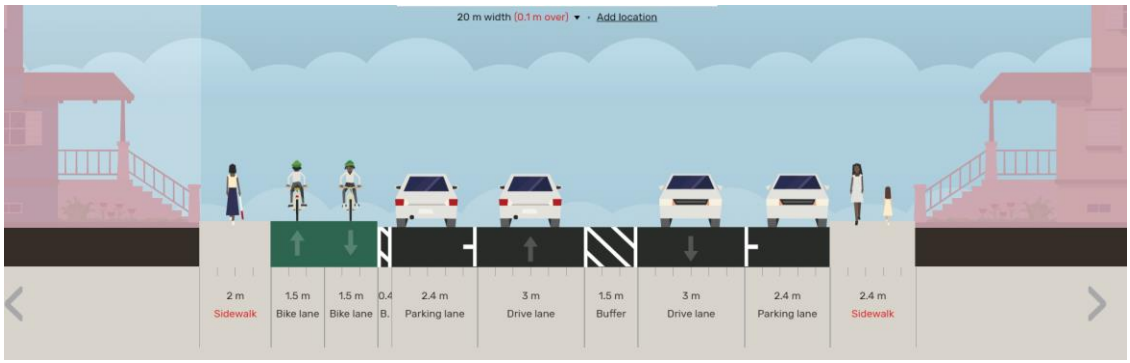


A two-way facility on one side of Knights Road would mean that users could access the Beltway with the controlled crossing at Waterloo Station, and go north or south from there. If a parallel facility were developed on Waterloo, then it would need to be implemented over 2.2km rather than 1.1km, a solution would need to be found to cross Oxford Terrace at the slip road from Waterloo, and a connection between the two facilities would need to be addressed. We believe all of these requirements would multiply the cost involved, and would not add to the clarity of the connection.

Engineering investigation would be required to design the best extended-kerb solution, so we recommend that this be scoped with urgency and more detailed options be presented to the Regulatory and Infrastructure Committee in July. Ideally construction would be timed to coincide with any work to services required in the near future, in particular Wellington Water.

If an extended kerb option is chosen and can be implemented within one year, we recommend that in the interim, the trial layout between Waterloo Station and Willoughby Street, remain in place, with the temporary amendments to the layout suggested in the post-implementation audit that have been delayed due to contractor availability and to weather. If this option is not feasible, we recommend that an alternative, dedicated lane on the road be installed on both Knights and Waterloo to provide for bike and e-scooter traffic in both directions.

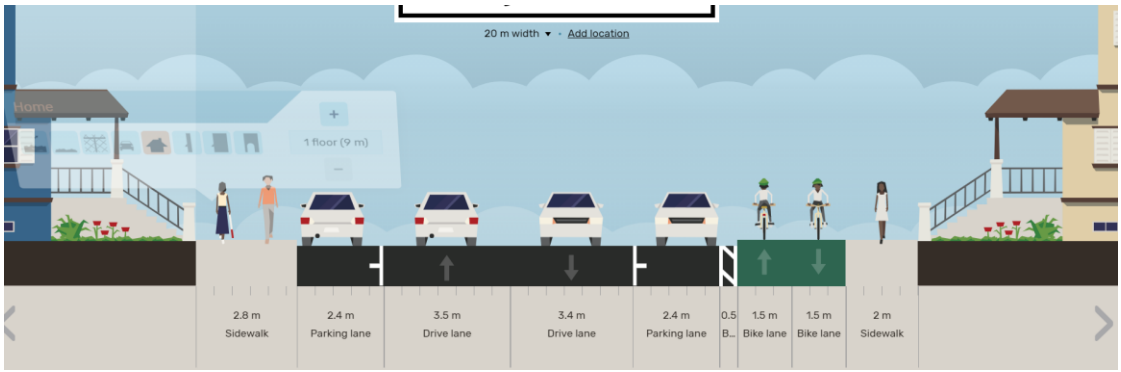
Suggested permanent layout: Extended kerb layout providing a two-way facility for people on bikes and e-scooters on the south side of Knights Rd. (RoC= $6,974,000)



Note: Vehicle lanes and median strip remain at the current, trial widths. Could be possible to increase width of the median to 2m as the Austroads recommendation for a shared facility is a minimum 4.5m

This solution would be on the south side with the five intersections. Four of these intersections are identified as needing significant work to the kerb build out facilities to bring them up to a quality standard, and we are recommending that this work be done regardless of whether or not this solution is implemented. Thus the consistent, high quality corridor would be on this side of the road. A higher proportion of existing riders travel on this side of the road, and the turn to reach four local schools is on this side of the road.

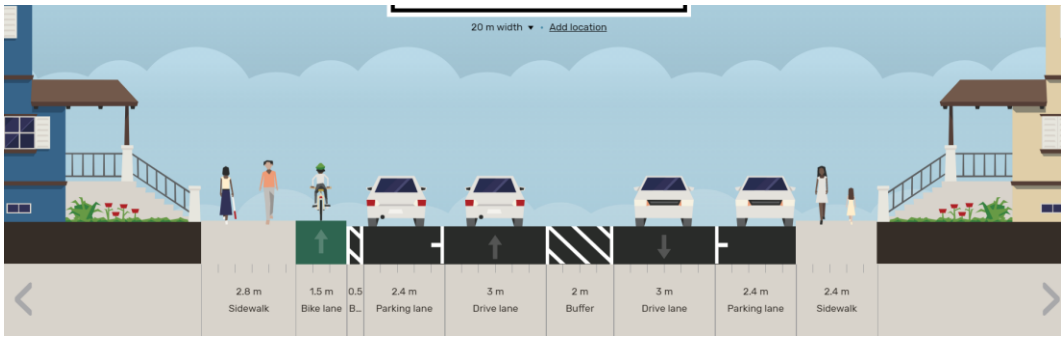
Alternative permanent layout 1: Extended kerb layout providing a two-way facility for people on bikes and e-scooters on the north side of current layout



Note: vehicle lanes are widened to their pre-trial widths, but the median strip is lost to provide space for the 2-way facility and parking on both sides of the road. This is because the northern footpath is 400mm narrower than the southern footpath, and so re-doing the kerb and channel on this side gains 400mm of street width, rather than 800mm.

This solution on the north side would cross only one intersection at Mahoe St, which has also been identified as requiring remedial work. The intersections on the south side of Knights Road would still need to be addressed. Chilton St James is on this side of Knights Road.

Alternative permanent layout 2: Extended kerb layout providing a one-way facility for people on bikes and e-scooters on the south side of current layout



Note: *Vehicle lanes and parking are kept at their current width, but the median strip is widened 0.5m to improve the perception of space. In order to address the connected network, a parallel facility would be required on another road, likely Waterloo Road. As with option 1, this layout would cross five intersections, but would do so in the direction of travel.*

Alternatives to an extended kerb solution

Option One: Retain and extend trial layout (RoC $384,000-$589,000)

Recommend to the Regulatory and Infrastructure Committee that the trial layout remain in place, with the plan to extend it and make the corridor improvements in the summer of 2020/21 as far as Bloomfield Terrace and to install a similar layout on the northern side of Waterloo for eastbound movements. As the permanent link, improve the surface of the trial area, and consider adding in the buffer islands as in Rongotai or Dunedin.

The buffer islands have the advantage of providing a clear guideline for parking, preventing vehicle encroachment across into the separated pathway and better delineating driveways. Both reviews done in May recommended adding these buffer islands.

Note that adding in these buffer islands would likely require the purchase of a small sweeping machine by contractors. It does add a level of complication for rubbish collection als, and when tested with the community in April there were some concerns raised about the islands.

Current trial layout pictured below





Option Two: Painted cycleway on south side outside of parked cars as per March trial northern side layout

(no formal ROC for this option, but likely to be between $390,000 and $500,000)

Recommend to the Regulatory and Infrastructure Committee that the trial layout be amended to a one-way painted pathway for bikes and e-scooters with the plan to extend it and make the corridor improvements in the summer of 2020/21 as far as Bloomfield Terrace and to install a similar layout on the northern side of Waterloo for eastbound movements. As the permanent link, implement the safety and surface improvements recommended by Beca.

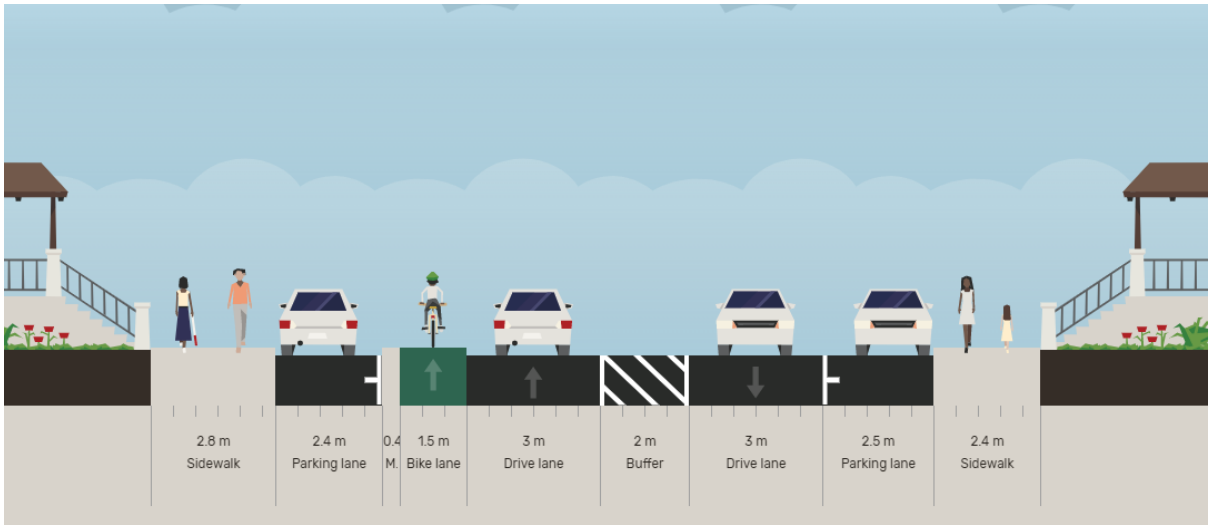




Image of the recommended layout but suggest this is implemented on the southern side of Knights Road, as this sees the most cyclist traffic and is the turn to access four schools, and on the northern side of Waterloo, with the additional greening suggested by Beca.

If the extended kerb version is the preferred option, but construction is further out than the next 12 months, this layout would also be our suggested interim layout on both Knights Road and Waterloo Road. We do not believe that the current trial layout achieves enough of a level of benefit above this layout to justify the greater cost and disruption if it is only an interim measure.

Option Three: Return to baseline with safety improvements (RoC $393,000)

Recommend to the regulatory committee that the trial layout between Waterloo Station and Willoughby Street be returned to baseline with the safety improvements recommended by Beca. This would involve removing extraneous markings and re-marking the road.



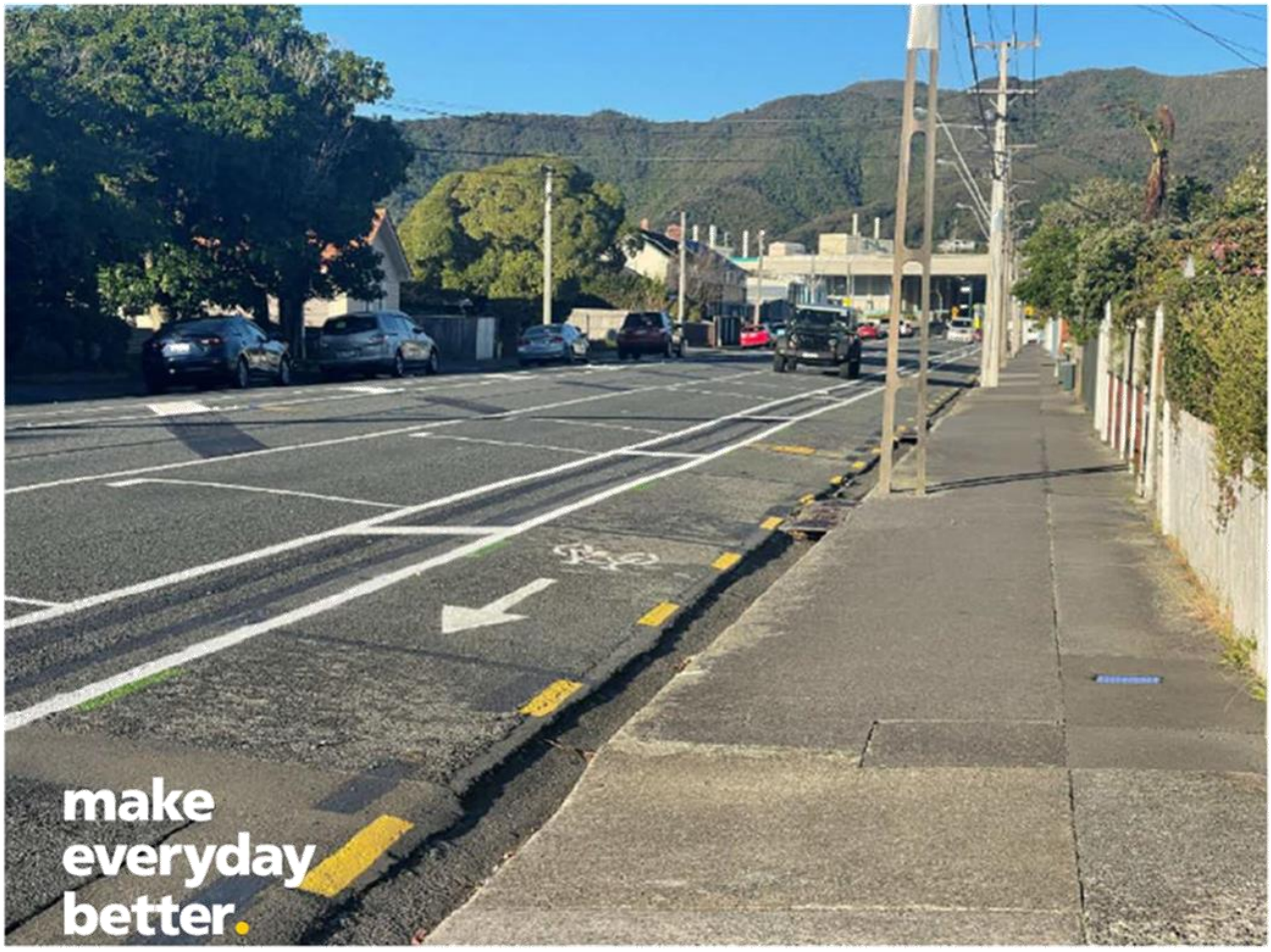
Recommendation 5: Safety and quality improvements

Regardless of which option is chosen (extended kerb, separated pathway or painted lane), the repairs and safety improvements recommended by Beca and outlined in the sections above are implemented to provide a safe and good-quality corridor connection for all users. Removal of unneeded road-markings is also required, regardless of which option is chosen. This is significant work, but needs done and has been identified by safety reviews and been a consistent theme of public feedback throughout this trial. Therefore it is included in all of the above rough order costs.

Knights Road Temporary Cycleway – Post Implementation Safety Audit

Prepared for Hutt City Council
Prepared by Beca Limited

20 May 2021

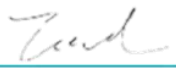


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Revision History

Revision N°	Prepared By	Description	Date
1	Tessa Lin	Draft for client review	20 May 2021

Document Acceptance

Action	Name	Signed	Date
Prepared by	Tessa Lin		18 May 2021
Reviewed by	Michael Town		18 May 2021
Approved by	Caron Greenough		20 May 2021
on behalf of	Beca Limited		

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- 2.7 Pedestrian crossing points at intersections - Minor 14
- 2.8 Pohutukawa Street / Knights Road - Minor 15
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- 2.10 Flexi-posts on Oxford Terrace - Comment 18
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Appendices

Appendix A – Design Drawings

1 Introduction

1.1 Safety Audit Procedure

A road safety audit is a term used internationally to describe an independent review of a future road project to identify any safety concerns that may affect the safety performance. The audit team considers the safety of all road users and qualitatively reports on road safety issues or opportunities for safety improvement.

A road safety audit is therefore a formal examination of a road project, or any type of project which affects road users (including cyclists, pedestrians, mobility impaired etc), carried out by an independent competent team who identify and document road safety concerns.

A road safety audit is intended to help deliver a safe road system and is not a review of compliance with standards.

The primary objective of a road safety audit is to deliver a project that achieves an outcome consistent with Safer Journeys and the Safe System approach, that is, minimisation of death and serious injury. The road safety audit is a safety review used to identify all areas of a project that are inconsistent with a safe system and bring those concerns to the attention of the client in order that the client can make a value judgement as to appropriate action(s) based on the risk guidance provided by the safety audit team.

The key objective of a road safety audit is summarised as:

To deliver completed projects that contribute towards a safe road system that is increasingly free of death and serious injury by identifying and ranking potential safety concerns for all road users and others affected by a road project.

A road safety audit should desirably be undertaken at project milestones such as:

- Concept Stage (part of Business Case);
- Scheme or Preliminary Design Stage (part of Pre-Implementation);
- Detailed Design Stage (Pre-implementation / Implementation); and
- Pre-Opening / Post-Construction Stage (Implementation / Post-Implementation).

A road safety audit is not intended as a technical or financial audit and does not substitute for a design check on standards or guidelines. Any recommended treatment of an identified safety concern is intended to be indicative only, and to focus the designer on the type of improvements that might be appropriate. It is not intended to be prescriptive and other ways of improving the road safety or operational problems identified should also be considered.

In accordance with the procedures set down in the *"NZTA Road Safety Audit Procedures for Projects, Interim Release* dated May 2013", the audit report should be submitted to the client who will instruct the designer to respond. The designer should consider the report and comment to the client on each of any concerns identified, including their cost implications where appropriate, and make a recommendation to either accept or reject the audit report recommendation.

For each audit team recommendation that is accepted, the client shall make the final decision and brief the designer to make the necessary changes and/or additions. As a result of this instruction the designer shall action the approved amendments. The client may involve a Technical Services & Design Manager to provide commentary to aid with the decision.

Decision tracking is an important part of the road safety audit process. A decision tracking table is embedded into the report format at the end of each set of recommendations to be completed by the designer, Road Safety

Engineer and client for each issue documenting the designer response, Project Sponsor (and asset manager's comments in the case where the client and asset manager are not one and the same) and action taken.

A copy of the report including the designer's response to the client and the client's decision on each recommendation shall be given to the road safety audit team leader as part of the important feedback loop. The road safety audit team leader will disseminate this to team members.

1.2 Safety Audit Team

The audit has been undertaken by Beca Ltd (Beca) at the request of Hutt City Council. This report presents the findings of a **Post-Construction Stage Road Safety Audit** of Knights Road Innovating Streets project – Stage 2.

Safety issues have been considered against current guideline, safety experience and practice where relevant.

The audit team for the Post-Construction Safety Audit were as follows:

- Caron Greenough — Safety Audit Reviewer – Senior Associate
- Michael Town — Road Safety Auditor – Senior Transportation Engineer
- Tessa Lin — Road Safety Auditor – Transportation Engineer

The field audit and observation were carried out on 14th May 2021 at 15:00pm.

1.3 Report Structure

The potential road safety problems identified have been ranked based on the expected frequency and severity of a potential crash.

The expected crash frequency is qualitatively assessed on the basis of expected exposure (how many road users will be exposed to a safety issue) and the likelihood of a crash resulting from the presence of the issue. The severity of a crash outcome is qualitatively assessed on the basis of factors such as expected speeds, type of collision, and the transport mode involved.

Reference to historic crash rates or other research for similar elements of projects, or projects as a whole, have been drawn on where appropriate to assist in understanding the likely crash types, frequency and likely severity that may result from a particular concern.

The frequency and severity ratings are used together to develop a combined qualitative risk ranking for each safety issue using the Risk Assessment Matrix in Table 1-1 below. The qualitative assessment requires professional judgement and a wide range of experience in projects of all sizes and locations.

Table 1-1 Risk Assessment Matrix

Severity (Likelihood of Death or Serious Injury Consequence)	**Frequency (Probability of a Crash)**			
	Frequent	**Common**	**Occasional**	**Infrequent**
Very Likely	Serious	Serious	Significant	Moderate
Likely	Serious	Significant	Moderate	Moderate
Unlikely	Significant	Moderate	Minor	Minor
Very Unlikely	Moderate	Minor	Minor	Minor

While all safety concerns should be considered for action, the client or nominated project manager will make the decision as to what course of action will be adopted based on the guidance given in this ranking process with consideration to factors other than safety alone. As a guide a suggested action for each risk category is given in Table 1-2 below.

Table 1-2 Risk Categories

RISK	Suggested Action
Serious	A major safety concern that should be addressed and requires changes to avoid serious safety consequence.
Significant	Significant risk that should be addressed and requires changes to avoid injury consequence
Moderate	Moderate risk that should be addressed to improve overall safety
Minor	Minor risk that should be addressed where practical to improve overall safety.

In addition to the ranked safety issues it is appropriate for the safety audit team to provide additional comments with respect to items that may have a safety implication but lie outside the scope of the safety audit. A comment may include items where the safety implications are not yet clear due to insufficient detail for the stage of project, items outside the scope of the audit such as existing issues not impacted by the project or an opportunity for improved safety but not necessarily linked to the project itself. While typically comments do not require a specific recommendation, in some instance's suggestions may be given by the auditors.

1.4 Documents Reviewed

The documents supplied by Hutt City Council reviewed in this Safety Audit as summarised in Table 1-3, were as follows:

Table 1-3 Post-Construction Documentation

Document Title & Number	Revision (Date Issued)
INITIAL DRAWING - PHASE 2 CYCLEWAY PROJECT KNIGHTS ROAD, HUTT CENTRAL	0 (06 April 2021)
Knights Road trial layout: Report on engagement feedback and data	April 2021
Powerpoint: Auaha evolving spaces	28 March 2021

The initial drawings of the cycleway project supplied by Hutt City Council are attached in Appendix A.

1.5 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 safety audit team (SAT). However, it must be recognised that eliminating safety concerns cannot be guaranteed since no road can be regarded as absolutely safe and no warranty is implied that all safety issues have been identified in this report. Safety audits do not constitute a design review, nor an assessment of standards with respect to engineering or planning documents.

Readers are urged to seek specific technical advice on matters raised and not rely solely on the report.

While every effort has been made to ensure the accuracy of the report, it is made available on the basis that anyone relying on it does so at their own risk without any liability to the safety audit team or their organisations.

2 Audit Findings

2.1 Green paint markings on the cycleway - Moderate

At the time of the site visit, the proposed dashed green markings on the Knights Road cycleway have been marked, with a short section across the Pohutukawa Street intersection yet to be marked.

As shown in Figure 2-1, the green dashed markings along the right edge of the cycleway are inconspicuous, especially under the effects of sun-strike. In addition, as shown in Figure 2-2, there are only dashed green markings across intersections. With inconspicuous cycleway marking, drivers accessing driveways or drivers negotiating intersections may not be aware of the cycleway, and the cyclists travelling on it at different speeds, leading to conflict and a potential crash.



Figure 2-1 Green markings on the Knights Road cycleway (looking west)



Figure 2-2 Green markings across the Willoughby Street intersection

Recommendation:

It is recommended that the conspicuity of green markings on the cycleway should be improved, especially at key driveways and intersections. This could be achieved through continuous green coloured pavement across the intersections, increasing the frequency or width of the dashed green markings along the cycleway and increasing the frequency of the cycle symbols.

Frequency Rating: ***Occasional*** *Severity Rating:* ***Likely***

Designers Comment:

Road Safety Engineer:

Project Sponsor:

Action Taken:

2.2 Sight distance from Mahoe Street and between parked cars - Moderate

As shown in Figure 2-3, the no-stopping restriction marking on the northern side of Knights Road, to the west of the Mahoe Street intersection only extends approximately 2.0m beyond the intersection. When a car is parked in front of 173 Knights Road near the intersection, the sight distance for vehicles from Mahoe Street to the west is limited to no more than 50m. In this 50km/h environment the Safe Intersection Sight Distance (SISD) is recommended as 97m.

The sight distance issue also occurs at driveways. Vehicles can be parked in the designated parking space on either side of the driveway in most cases. When there are vehicles parked on both sides of a driveway, the sight distance between parked cars to either direction of the traffic is limited.

The limited sight distance to the oncoming traffic increases the difficulty for drivers exiting Mahoe Street and driveways, increasing the likelihood of a crash (particularly for exiting driveways where there is no shoulder and somewhat narrow lanes).



Figure 2-3 View from Mahoe Street, facing west

Recommendation:

It is recommended that the no-stopping restriction markings on the northern side of Knights Road to the west of the Mahoe Street intersection should be extended to mitigate the visibility issue for turning vehicles.

Lowering the speed environment is recommended to limit the severity and likelihood of a potential crash for those exiting driveways. This could be achieved through speed management, including reducing the permanent speed limit and/or providing traffic calming features.

Alternatively removing some parking spaces adjacent to driveways to improve the visibility should also be considered.

Frequency Rating: ***Common*** *Severity Rating:* ***Unlikely***

Designers Comment:

Road Safety Engineer:

Project Sponsor:

Action Taken:

2.3 Lack of cycle facilities on the eastbound traffic lane - Moderate

There are no dedicated cycle facilities in the eastbound direction, and the shoulders are often occupied by parked vehicles, so it is expected that cyclists and vehicles will share the eastbound traffic lane. Vehicles may use the flush median to pass the cyclists, giving a total width of up to 4.1m.

It is understood by the SAT that an eastbound cycleway will be provided on [redacted] to form a one-way cycleway system. However, in advance of [redacted], given a number of eastbound cyclists on Knights Road are still expected, there is a risk of cyclist injury crashes given the current 50km/h speed environment.

Recommendation:

Lowering the speed environment is recommended to limit the severity of a potential cyclist crash. This could be achieved through speed limit management, including reducing the permanent speed limit and providing traffic calming features such as raised safety platforms.

Frequency Rating: ***Infrequent*** *Severity Rating:* ***Likely***

Designers Comment:

Road Safety Engineer:

Project Sponsor:

Action Taken:

2.4 Wide shoulder next to speed hump - Moderate

There is approximately 1.6m of space between the kerb and the speed hump (as marked in the red circle in Figure 2-4) eastbound at the Pohutukawa Street intersection. It is assumed that this space is provided for cyclists to travel through the shoulder without being affected by the speed hump.

The SAT observed on site an eastbound vehicle that used the shoulder to avoid travelling over the speed hump. Such behaviour brings vehicles much closer to the kerb, reducing the available space for cyclists but also leading to limited sight distance to the zebra crossing forward of the speed humps, increasing vehicle speeds, and increasing the risk of a potential injury crash. This unexpected behaviour may also result in a collision with a cyclist travelling east.



Figure 2-4 Speed humps on eastbound traffic lanes at the end of Knights Road

Recommendation:

Vehicles should be discouraged from using the shoulder to avoid the speed hump through the use of riley kerbs or similar vertical delineation devices.

A raised safety platform as a permanent option is also recommended, as raised safety platforms not only encourage safer speeds but also cannot be avoided.

Frequency Rating: ***Occasional*** *Severity Rating:* ***Likely***

Designers Comment:

Road Safety Engineer:

Project Sponsor:

Action Taken:

2.5 Signs supporting mixed use traffic lanes - Moderate

Figure 2-5 shows the western end of the cycleway on Knights Road. Currently, there is a 'CYCLE LANE ENDS (Includes E-scooters)' sign installed at the transition section on the northern side of the footpath, facing east.

The audience of the sign is cyclists and micro-mobility users, while vehicle users may not be aware of the end of the cycleway. Drivers may not expect cyclists to transition back into the traffic lane where the cycleway ends and where the shoulder is occupied by parking vehicles. In addition, as discussed in **Section 2.3 Lack of cycle facilities on the eastbound traffic lane - Moderate**, vehicles and cycles have to share the eastbound traffic lane due to the lack of cycle facilities. With no signs or any other treatments for the eastbound traffic, drivers may not be aware of cyclists sharing the lane, resulting in a crash.

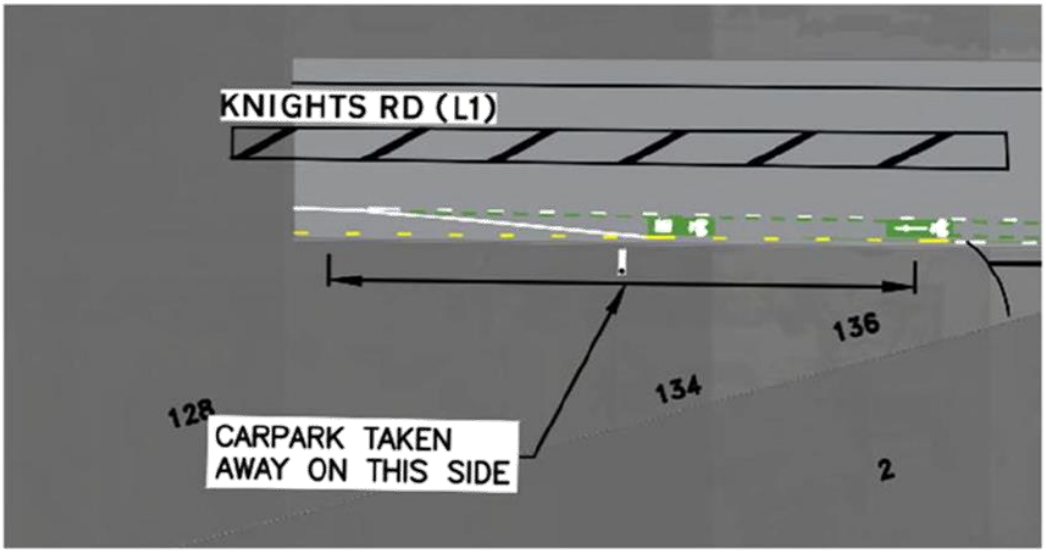


Figure 2-5 Western end of the cycleway on Knights Road

Recommendation:

It is recommended that signs, such as a "1.5M PASS SAFELY" sign or "Share the Lane" signage, are provided for the eastbound traffic and at the termination of the cycleway for the westbound traffic to remind drivers of on-road cyclists.

In addition, speed management features will also lower this risk (as recommended in Section 2.3).

Frequency Rating: ***Infrequent*** *Severity Rating:* ***Likely***

Designers Comment:

Road Safety Engineer:

Project Sponsor:

Action Taken:

2.6 Lack of physical separation on the outer edge of safety gap - Minor

Physical cycle delineators are proposed on the drawings to guide parked vehicles away from the cycleway. During the time of the site visit, the cycle separators were not in place. The SAT observed that some vehicles used the door zone buffer for parking, as shown in Figure 2-6, as no physical treatments stopped this behaviour and drivers preferred to have space to open their door. The narrower clearance between parking vehicles and the cycleway may cause a cyclist to hit an opened passenger door. The risk of dooring is minor however given that the car parking demand on the southern side of the road is low, and the cycleway is on the passenger side.



Figure 2-6 Parking vehicles adjacent to the safety gap on the southern side of Knights Road

Recommendation:

It is recommended that the physical separators are provided on the outer edge of the safety gap to mitigate cyclist dooring crashes. Given that the delineators were not installed during the site visit, it is difficult to know whether the delineators will effectively stop vehicles from using the door buffer zone for parking. It is recommended that another site visit should be conducted after the delineators are installed.

Frequency Rating: ***Infrequent*** *Severity Rating:* ***Unlikely***

Designers Comment:

Road Safety Engineer:

Project Sponsor:

Action Taken:

2.7 Pedestrian crossing points at intersections - Minor

The grade of some of the existing pram crossings is steep (8°-11° as measured on site). In addition, there are no tactile pavers at the current kerb ramps at pedestrian crossing points. This provides challenges for impaired users to easily use the facility.

In addition, the surface of the kerb ramp on the eastern side of Willoughby Street is damaged. The SAT observed that there were children riding scooters on the footpath, and the poor condition of the kerb ramp surface creates a trip hazard for these users.



Figure 2-7 Pedestrian kerb ramp on the eastern side of Willoughby Street

Recommendation:

It is recommended that the damaged ramps should be fixed, and a lower gradient of ramps should be provided. Generally, the gradient should not exceed 8% (approximately 4.6°) longitudinally along a footpath for easy access for all users. The detailed requirements can be found as per Waka Kotahi's Pedestrian Planning and Design Guide Section 14.

Tactile pavers should be considered along the Knights Road route.

Frequency Rating: ***Infrequent*** *Severity Rating:* ***Likely***

Designers Comment:

Road Safety Engineer:

Project Sponsor:

Action Taken:

2.8 Pohutukawa Street / Knights Road - Minor

During the site visit, the green cycleway markings and kerb ramps across Pohutukawa Street, as shown in Figure 2-8, have not been constructed. The proposed kerb ramp on the western side of Pohutukawa Street will provide connectivity from the on-road cycleway to the existing footpath. However, the existing footpath width is narrow, and cycling on the footpath would increase the risk of collisions between cyclists and pedestrians, especially in front of the shops. In addition, the cycleway marking across the intersection may not be visible enough for turning vehicles and may encourage cyclists to enter the road without giving way, leading to a crash. There is also an additional risk that vehicles turning right into Pohutukawa Street will turn and then stop for pedestrians crossing on the zebra and then block the cycleway.

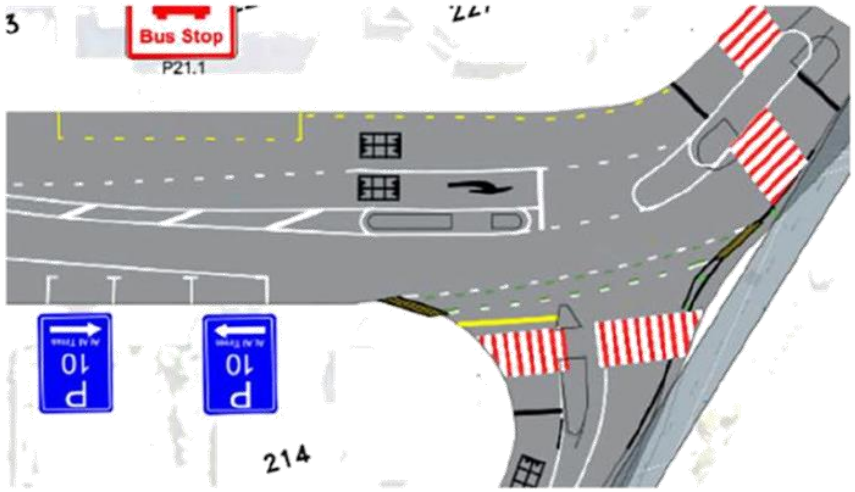


Figure 2-8 Pohutukawa Street / Knights Road intersection

Recommendation:

Consider combining the cyclist and pedestrian crossing on a raised table to slow vehicle speeds and clearly define who has priority at this busy location.

Frequency Rating: ***Occasional*** *Severity Rating:* ***Unlikely***

Designers Comment:

Road Safety Engineer:

Project Sponsor:

Action Taken:

2.9 Road marking guiding traffic - Comment

Figure 2-9 shows the current line marking at the bus stop in front of 146 Knights Road. It was found on site that the westbound traffic lane suddenly increased beyond 148 Knights Road to the west, encouraging a higher operating speed.

Figure 2-10 shows the current layout of the Pohutukawa Street / Knights Road intersection. As measured on the plan, the width of the traffic lane along a short section from the parallel parking to the intersection is more than 5m wide. There is no delineation from the edge of the intersection to the start of the parallel parking.

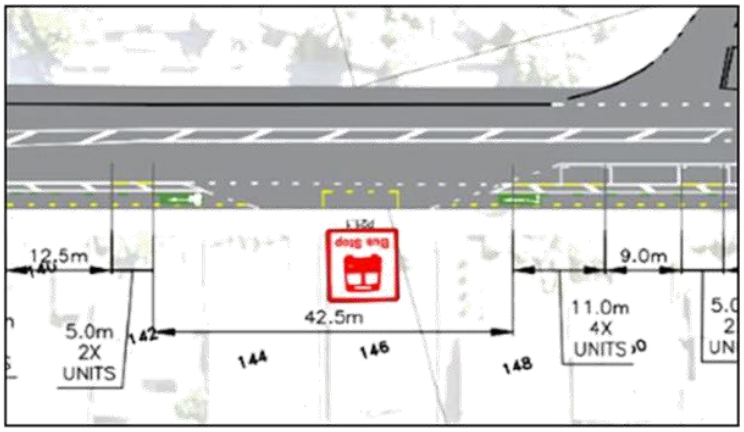


Figure 2-9 Line marking at the bus stop in front of 146 Knights Road

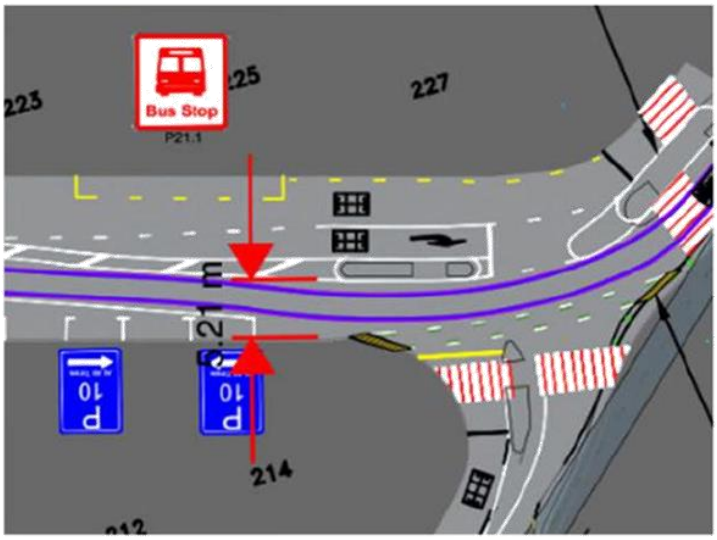
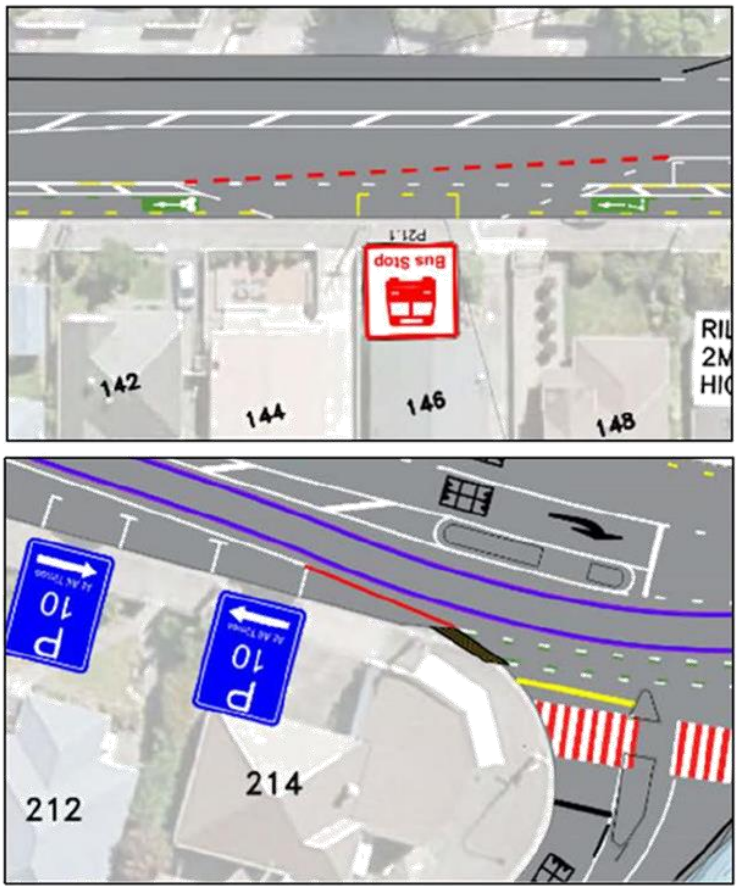


Figure 2-10 Pohutukawa Street / Knights Road intersection

Recommendation:

Delineation should be provided to guide drivers away from parked vehicles, and to narrow the traffic lanes to encourage slower speeds. Some suggested improvements are shown below.



Frequency Rating: ***N/A*** *Severity Rating:* ***N/A***

Designers Comment:

Road Safety Engineer:

Project Sponsor:

Action Taken:

2.10 Flexi-posts on Oxford Terrace - Comment

There are existing flexi-posts on the eastern side of Oxford Terrace between two zebra crossings, as shown in Figure 2-11 and Figure 2-12. The SAT understand they are intended to guide both vehicles and cyclists across the zebra crossing at a perpendicular angle to slow down approach speeds. However, cyclists may ride through the space between the flexi-posts and the kerb, leading to a collision with a crossing pedestrian.

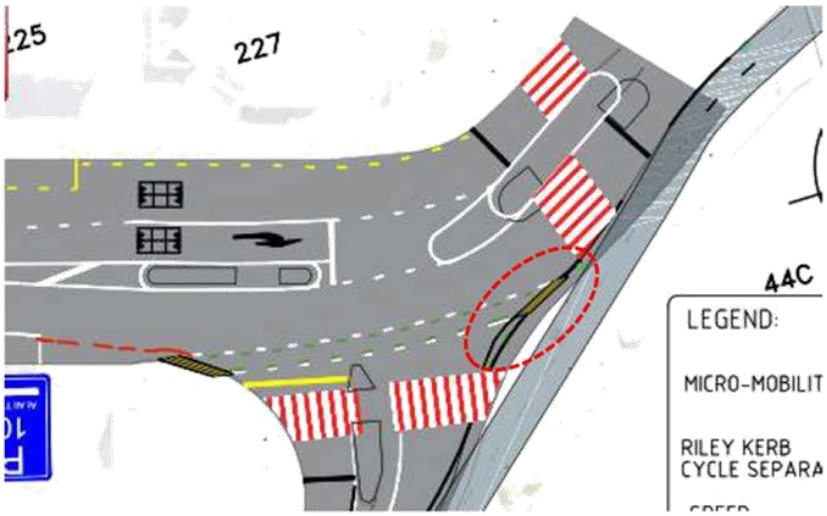


Figure 2-11 The location of flexi-posts in the drawing



Figure 2-12 The location of the existing flexi-posts

Recommendation:

Consider installing an additional flexi-post to the north of the pedestrian crossing to guide cyclists away from this space.

Frequency Rating: ***N/A*** *Severity Rating:* ***N/A***

Designers Comment:

Road Safety Engineer:

Project Sponsor:

Action Taken:

2.11 Cycle lane surface condition - Comment

The pavement surface outside 142 Knights Road featured large potholes and a non-standard vehicle access ramp from the cycle lane as shown in Figure 2-13. These features create a hazard for cycle lane users, particularly those with smaller wheels such as e-scooters.



Figure 2-13 Damaged pavement outside 142 Knights Road

These potholes and trip hazards should be repaired and or/removed to eliminate this hazard.

Frequency Rating: ***N/A*** *Severity Rating:* ***N/A***

Designers Comment:

Road Safety Engineer:

Project Sponsor:

Action Taken:

2.12 Cross section - Comment

The SAT recorded the dimensions of the post-construction cross section at three locations upon Hutt City Council's request. It was found that the flush median was generally wider than the design cross section. The design indicated a 1.1m wide flush median, while the measured flush median was about 1.5m wide. The dimensions for the other cross section elements were generally consistent with the construction plans. It is not considered as an issue as the wider flush median would provide more space for eastbound vehicles to pass cyclists in the same direction safely.

However, at the next stage consider how to best use the road space available to give the appropriate space for all road users.

Frequency Rating: ***N/A*** *Severity Rating:* ***N/A***

Designers Comment:

Road Safety Engineer:

Project Sponsor:

Action Taken:

3 Audit Statement

We certify that in carrying out this audit we have inspected the site and used the drawings and listed in Appendix A. We have endeavoured to identify features that could be modified or removed in order to improve safety, although it must be recognised that safety cannot be guaranteed since no road can be regarded as absolutely safe.

The problems identified have been noted in this report together with recommendations that should be studied for implementation. Readers are urged to seek further specific technical advice on matters raised and not rely solely on the report. Where recommended actions are not taken, this should be reported in writing, providing the reasons for that decision.

Signed: ..... Date: 20/05/2021

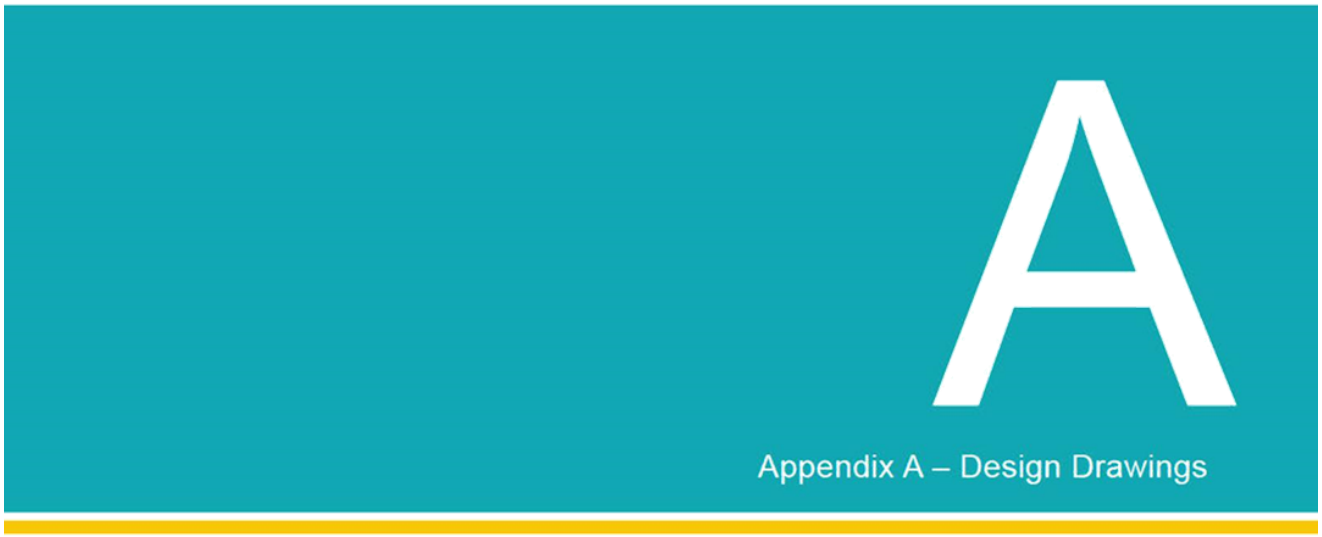
Michael Town, Senior Transportation Engineer
Beca, Nelson

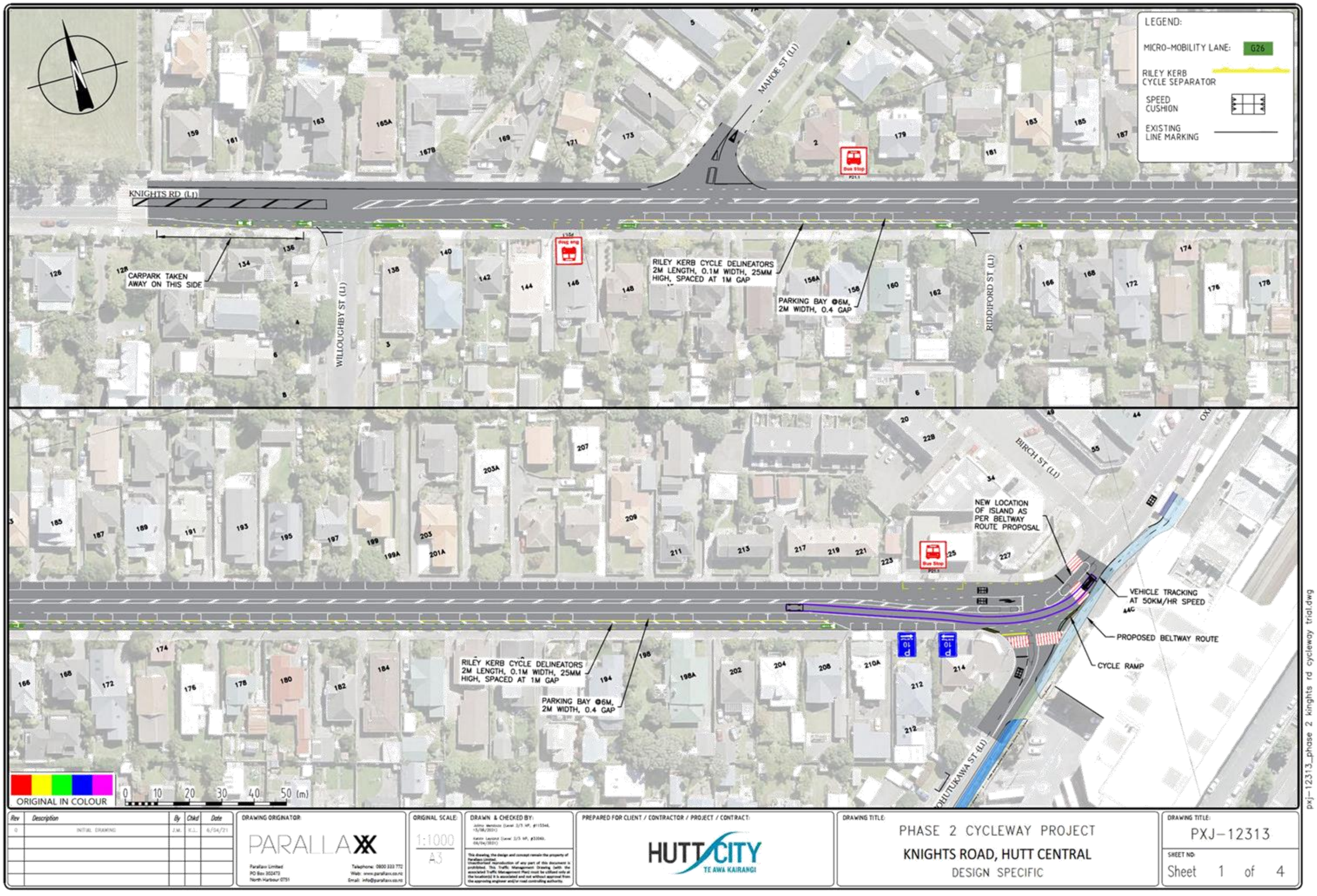
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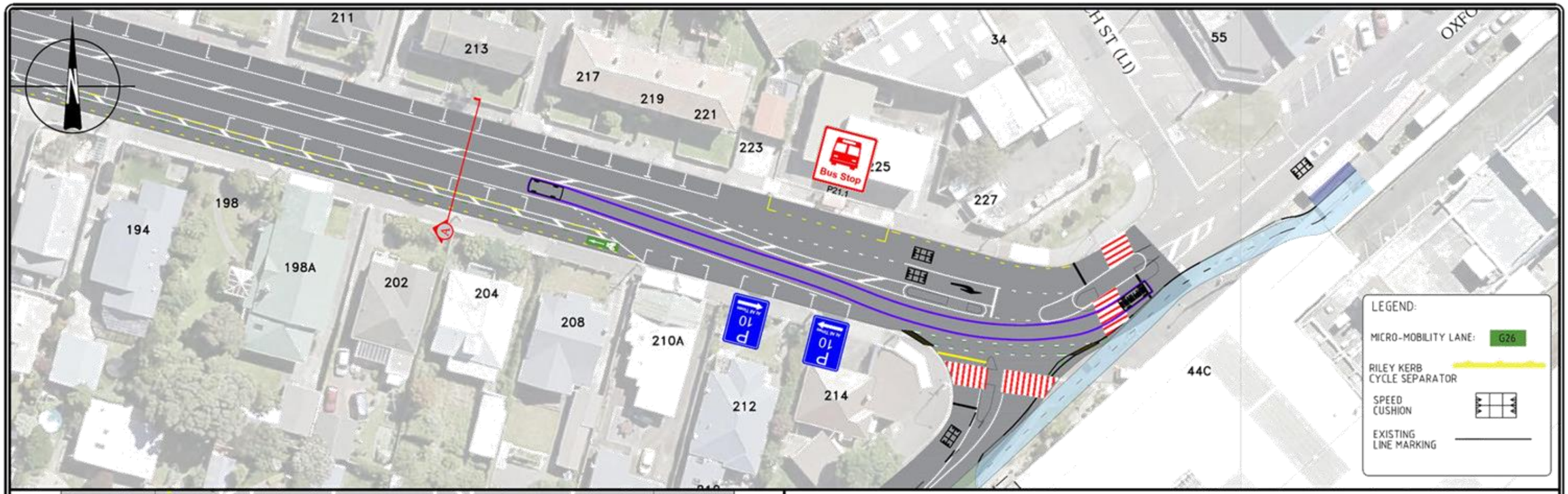
Tessa Lin, Transportation Engineer
Beca, Wellington

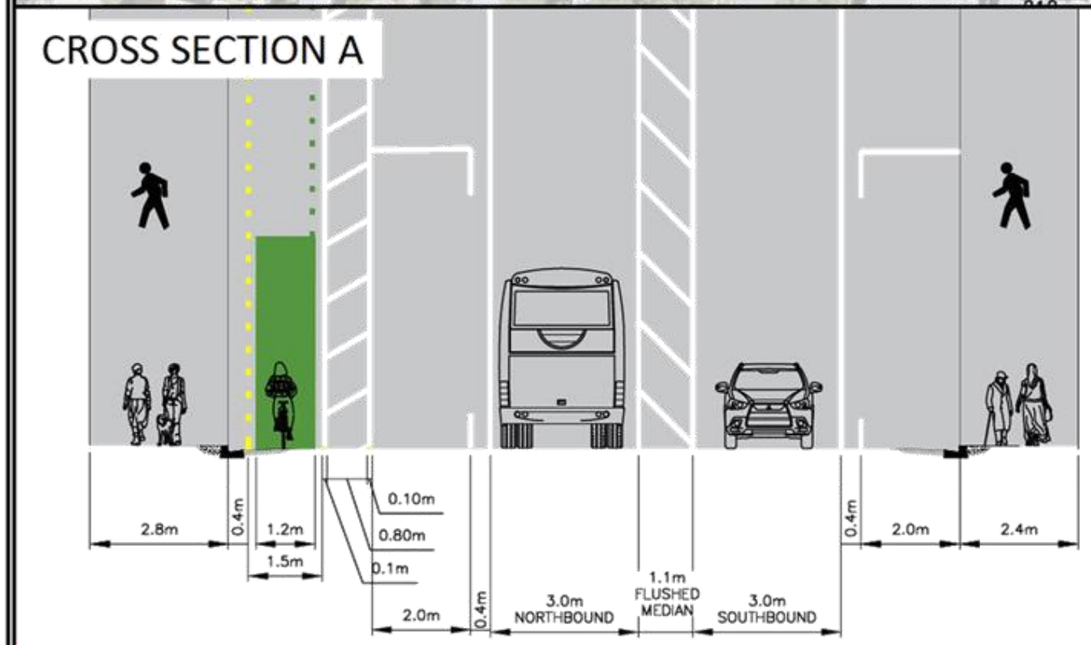
Designer:	Name:……	Position:……
	Signature:……....	Date:……....
Road Safety Engineer:	Name:……	Position:……
	Signature:……....	Date:……....
Project Manager:	Name:……	Position:……
	Signature:……....	Date:……....
Action Completed:	Name:……	Position:……
	Signature:……....	Date:……....

Project Manager to distribute audit report incorporation decision to Designer, Safety Audit Team Leader, Technical Services & Design Manager and project file Date:


A
Appendix A – Design Drawings


LEGEND:
MICRO-MOBILITY LANE: G26
RILEY KERB CYCLE SEPARATOR
SPEED CUSHION
EXISTING LINE MARKING
KNIGHTS RD (L1)
MAHOE ST (L1)
WILLOUGHBY ST (L1)
RIDDIFORD ST (L1)
BIRCH ST (L1)
CARPARK TAKEN AWAY ON THIS SIDE
RILEY KERB CYCLE DELINEATORS 2M LENGTH, 0.1M WIDTH, 25MM HIGH, SPACED AT 1M GAP
PARKING BAY @6M, 2M WIDTH, 0.4 GAP
NEW LOCATION OF ISLAND AS PER BELTWAY ROUTE PROPOSAL
VEHICLE TRACKING AT 50KM/HR SPEED
PROPOSED BELTWAY ROUTE
CYCLE RAMP
RILEY KERB CYCLE DELINEATORS 2M LENGTH, 0.1M WIDTH, 25MM HIGH, SPACED AT 1M GAP
PARKING BAY @6M, 2M WIDTH, 0.4 GAP
ORIGINAL IN COLOUR
0 10 20 30 40 50 (m)
Rev Description By Chkd Date
0 INITIAL DRAWING J.M. K.J. 6/04/21
DRAWING ORIGINATOR:
PARALLAX
ORIGINAL SCALE:
1:1000 A3
DRAWN & CHECKED BY:
PREPARED FOR CLIENT / CONTRACTOR / PROJECT / CONTRACT:
HUTT CITY TE AWA KAIRANGI
DRAWING TITLE:
PHASE 2 CYCLEWAY PROJECT
KNIGHTS ROAD, HUTT CENTRAL
DESIGN SPECIFIC
DRAWING TITLE:
PXJ-12313
SHEET NO:
Sheet 1 of 4
pxj-12313_phase 2 kinghts rd cycleway trial.dwg





ORIGINAL IN COLOUR

CROSS SECTION A	
GAP	0.4m
MICRO-MOBILITY LANE	1.5m
CYCLE DELINEATOR	0.1m
SAFETY GAP	0.8m
CYCLE DELINEATOR	0.1m
PARKING LANE + GAP	2.4m
NORTHBOUND LANE	3m
FLUSHED MEDIAN	1.1m
SOUTHBOUND LANE	3m
EXISTING PARKING LANE	2.4m
TOTAL	14.8m

Rev	Description	By	Chkd	Date
0	INITIAL DRAWING	J.M.	K.L.	6/04/21

DRAWING ORIGINATOR: PARALLAX
Parallax Limited, PO Box 302473, North Harbour 0751. Telephone: 0800 333 772. Web: www.parallax.co.nz. Email: info@parallax.co.nz

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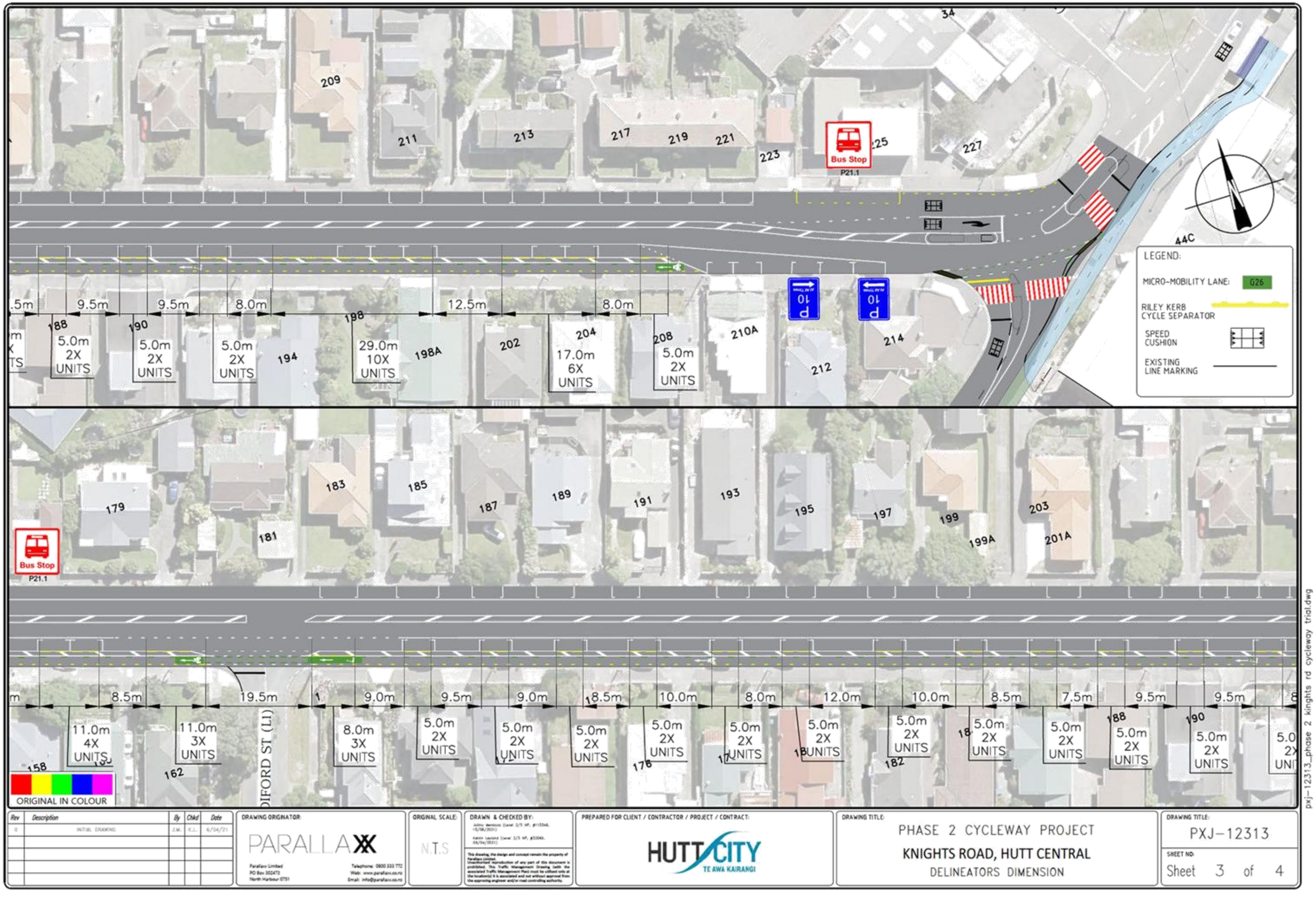
DRAWN & CHECKED BY:
Johno Mendoza (Level 3/5 NP, #115546, 15/04/2021)
Katie Layland (Level 3/5 NP, #33040, 06/04/2021)
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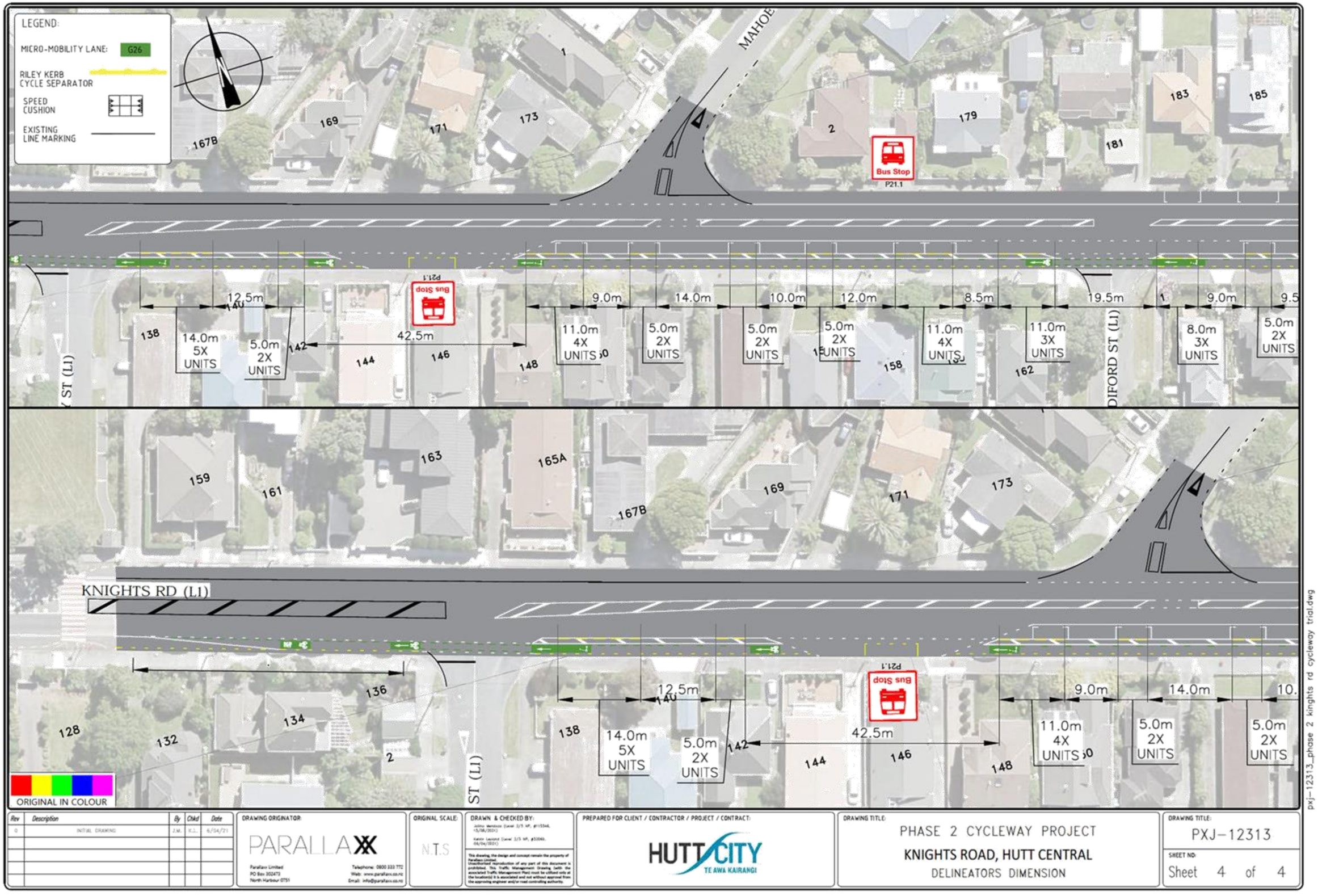
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DRAWING TITLE: PHASE 2 CYCLEWAY PROJECT
KNIGHTS ROAD, HUTT CENTRAL
CROSS SECTION

DRAWING TITLE: PXJ-12313
SHEET NO: Sheet 2 of 4

pxj-12313_phase 2 kinghts rd cycleway trial.dwg


Bus Stop
P21.1
LEGEND:
MICRO-MOBILITY LANE: G26
RILEY KERB CYCLE SEPARATOR
SPEED CUSHION
EXISTING LINE MARKING
9.5m
9.5m
8.0m
12.5m
8.0m
5.0m 2X UNITS
29.0m 10X UNITS
17.0m 6X UNITS
8.5m
19.5m
9.0m
9.5m
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12.0m
10.0m
8.5m
7.5m
9.5m
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11.0m 4X UNITS
11.0m 3X UNITS
8.0m 3X UNITS
5.0m 2X UNITS
DIFORD ST (LI)
ORIGINAL IN COLOUR
Rev Description By Chkd Date
0 INITIAL DRAWING J.M. K.J. 6/04/21
DRAWING ORIGINATOR:
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KNIGHTS ROAD, HUTT CENTRAL
DELINEATORS DIMENSION
DRAWING TITLE:
PXJ-12313
SHEET NO:
Sheet 3 of 4
pxj-12313_phase 2 kinghts rd cycleway trial.dwg


LEGEND:
MICRO-MOBILITY LANE: G26
RILEY KERB CYCLE SEPARATOR
SPEED CUSHION
EXISTING LINE MARKING
MAHOE
KNIGHTS RD (L1)
ST (L1)
DIFORD ST (L1)
Bus Stop
P21.1
12.5m
14.0m 5X UNITS
5.0m 2X UNITS
42.5m
9.0m
11.0m 4X UNITS
14.0m
5.0m 2X UNITS
10.0m
5.0m 2X UNITS
12.0m
5.0m 2X UNITS
8.5m
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KNIGHTS ROAD, HUTT CENTRAL
DELINEATORS DIMENSION
DRAWING TITLE:
PXJ-12313
SHEET NO:
Sheet 4 of 4
pxj-12313_phase 2 knights rd cycleway trial.dwg

Knights Road and Waterloo Safety Review

Prepared for Hutt City Council
Prepared by Beca Limited

3 June 2021



Creative people together transforming our world

Revision History

Revision N°	Prepared By	Description	Date
1	Michael Town	Issued to client	03/06/2021

Document Acceptance

Action	Name	Signed	Date
Prepared by	Michael Town		02/06/2021
Reviewed by	Caron Greenough		03/06/2021
Approved by	Caron Greenough		03/06/2021
on behalf of	Beca Limited		

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1 Introduction

Hutt City Council (HCC) are currently trialling cycle facility improvements on Knights Road as a part of the Innovating Streets project. This trial extends from Waterloo Station at Pohutukawa Street to Willoughby Street.

It is understood that following the completion of the trial the preferred cycle facility will be extended up to Bloomfield Terrace, with additional cycle facilities possible on [redacted] and along Oxford Terrace towards the end of the existing Beltway cycleway.

This road safety review will focus on the safety of this area of Knights Road and the surrounding area, as shown in Figure 1 below. Comment will also be made on the future facilities planned as part of the Beltway Cycleway project adjacent to Waterloo Station.

A site visit was undertaken on the 14th May 2021 between 3pm and 5pm.



Figure 1: Knights Road and Waterloo Safety Review extent

2 Safety Review

2.1 Safety Risk

2.1.1 Crash History

The crash history between 2011 and 2020 has been assessed using the Crash Analysis System (CAS). There have been 12 crashes resulting in injuries and 38 non-injury crashes on the corridor between the end of the Beltway on Oxford Terrace and the Knights Road / Bloomfield Terrace intersection.

Two crashes resulted in serious injuries and involved vehicles losing control whilst driving too fast, one turning left from Oxford Terrace into Pohutukawa Street and another performing a u-turn near Penrose Street. The majority of the injury crashes involve drivers failing to give way to others at an intersection or failing to notice other vehicles whilst performing a manoeuvre (parking etc). There have been no pedestrian related crashes.

Within the 50 total crashes there have been four crashes involving cyclists, three injury and one non-injury. These crashes involved:

- A vehicle turning left from Cornwall Street onto Knights Road failing to notice a through cyclist on Knights Road
- A vehicle turning left from Penrose Street onto Knights Road failing to notice a through cyclist on Knights Road
- A vehicle turning right from Mahoe Street onto Knights Road failing to notice a through cyclist on Knights Road
- A vehicle turning left at the Oxford Terrace roundabout failing to see a cyclist within the roundabout

2.1.2 Safety Metrics

The following information is taken from the MegaMaps database.

Table 2-1: Safety Metrics for Knights Road and Oxford Terrace

Safety Metric	Knights Road (Waterloo to Bloomfield)	Oxford Terrace (Waterloo to Beltway)
One Road Network Classification	Arterial/Primary Collector	Primary Collector
Collective Risk	Low-Medium	Low
Personal Risk	Medium	Low
Speed Limit	50km/h	50km/h
Safe and Appropriate Speed	50km/h	50km/h
Operating Speed	45km/h	37km/h

2.2 Knights Road

2.2.1 Pedestrian footpath ramps

Throughout the Knights Road corridor there are a number of pedestrian ramps at intersections or at crossing points that have poor or rough pavement surfaces, or that are steeper than the desirable 8% grade. In addition, many of the pedestrian crossing points did not have tactile pavers to warn footpath users, and in particularly visually impaired users, of the upcoming conflict with vehicles.



Figure 2: Poor footpath ramp surface at Willoughby Street with no tactile pavers



Figure 3: Steep footpath ramp and no tactile pavers at Bloomfield Terrace



Figure 4: Tactile pavers conflicting with vertical kerb at Bloomfield Terrace

This is in contrast with some recently upgraded intersections (Figure 5) that have smooth ramps that are easy to negotiate, and tactile pavers to warn pedestrians of the upcoming road crossing.



Figure 5: Smooth pedestrian ramps and tactile pavers at Colin Grove

It is recommended that the footpath facilities provided along this corridor, connecting Waterloo Station to the Queensgate Shopping Centre, are consistent and provide a good level of service for all types of users. As such tactile pavers should be provided where needed, and the pedestrian ramps should be smooth and gradual.

2.2.2 Speed Environment

The side road approaches to the Knights Road corridor are generally wide and are not effective at slowing down vehicles when entering or exiting Knights Road, particularly for left turning vehicles. This is particularly the case for Cornwall Street, Hautana Street, Penrose Street and Mahoe Street.





Figure 6: Wide crossing at Hautana Street

This width increases the crossing distance for pedestrians, and increases vehicles speed at conflict points with vehicles, pedestrians and cyclists. Of the four cyclist crashes, three of them occurred at these locations where turning vehicles entered the roadway without giving way to cyclists.

Information received from HCC for the section of Knights Road between Willoughby and Waterloo Station indicate an average speed of 42km/h for vehicles heading eastbound, slightly less than the 45km/h operating speed for the existing road in MegaMaps. Once the cycleway treatment is continued beyond Willoughby Street towards Queensgate it is expected that this will be an indication of the average eastbound speed for the full length of Knights Road. Given there may be some on-road cyclists heading eastbound on Knights Road [redacted], as well as the zebra pedestrian crossing adjacent to Willoughby Street, a target operating speed of 40km/h is suggested to manage these conflicts.

It is recommended that the target speed environment on Knights Road is 40km/h and that speeds at the side road intersections are reduced to lower the risk for cyclists using both the on-road cycle lanes westbound and the traffic lane eastbound. On Knights Road this may involve additional traffic calming measures beyond the cycle lane improvements. On the side roads vertical deflection could be used to lower vehicle speeds as they enter Knights Road or the side road approaches could be narrowed to lower vehicle speeds as well as to reduce the pedestrian crossing distance.

2.2.3 Zebra Crossing

The zebra pedestrian crossing located midblock on Knights Road adjacent to Willoughby Street has a number of safety concerns. The key issue is the crossings lack of conspicuity for approaching drivers, leading to some instances, observed on site, of drivers going through the crossing when pedestrians where waiting on the side to cross. The red paint and high friction surface on the approaches and the orange beslisha beacons did not stand out in the late afternoon during the site visit, with waiting pedestrians somewhat obscured by the shade from adjacent trees on the northern side (see Figure 7).



Figure 7: Poor conspicuity of the zebra crossing

In addition, the road has significant crossfall at this location, creating a steep pedestrian ramp grade to negotiate at this crossing. This is covered in Section 2.2.1.

It is recommended that driver awareness of this zebra crossing is increased to lower the risk at this location. This could be achieved through vertical deflection (Raised Safety Platform), which would also support the 40km/h speed environment target (see Section 2.2.2), enhanced signage (orange disc etc.) or traffic calming measures (e.g. a central median to create a threshold point). The pedestrian ramp grades should also be improved to provide a smooth transition with tactile pavers.

2.2.4 Bloomfield Terrace Roundabout

The roundabout at Knights Road and Bloomfield Terrace is a busy environment with many conflict points and a number of safety risks identified. The school zebra crossing on the southern approach on Bloomfield Terrace was busy during the school peak, with the one on the northern approach also used by general pedestrian traffic associated with the school and adjacent Queensgate Shopping Centre.

Due to the fences adjacent to the crossing on the southern approach as shown in Figure 8, drivers have limited visibility from the eastern Knights Road approach, and the beslisha beacons do not stand out during the daytime.



Figure 8: Pedestrian crossing hidden on the southern approach

In addition, these pedestrian crossings had steep ramp grades and pavement lips that present a challenge for some footpath users as shown in Figure 9 below.



Figure 9: Steep pedestrian ramp and pavement lip at the southern pedestrian crossing

On the western Knights Road approach shown in Figure 10, the lane width provided is very wide (approximately 5.5m). This allows vehicles to travel at higher speeds on this approach when turning left and going straight, increasing the risk of a serous crash with another road user.



Figure 10: Wide approach on Knights Road from the west

On the eastern Knights Road approach, the pedestrian crossing ramps and central island refuge are mis-aligned (see Figure 11 below). This makes it more difficult for visually impaired users to cross at this location, particularly without tactile pavers, and creates a potential trip hazard.



Figure 11: Misaligned pedestrian crossing on the eastern Knights Road approach

Given the multiple vehicle and pedestrian conflict points, it is recommended that the operating speed is lowered to 30km/h through the roundabout on all approaches. This is best achieved through vertical deflection (raised safety platforms), but other options include increasing the deflection for vehicles travelling through the roundabout with narrower lanes and a wider central mountable apron. In addition, the pedestrian crossing ramp grades should be improved to provide easy access for all footpath users, along with tactile pavers where needed.

2.2.5 Hautana Street

The Hautana Street intersection has a wide width (as shown in Figure 6) as a result of the large corner radii and the setback kerb. In addition to increasing the crossing distance for pedestrians, pedestrians crossing Hautana Street travelling east on Knights Road have restricted visibility towards traffic approaching from Hautana Street due to the setback kerb and adjacent fence/power poles as shown in Figure 12. This makes it difficult to select an appropriate gap to cross, especially given the long crossing distance.



Figure 12: Restricted visibility towards Hautana Street for pedestrians

There are also ghost markings present at the intersection from a previous layout, which may confuse drivers as they approach the intersection.



Figure 13: Ghost markings at Hautana Street

It is recommended that Hautana Street intersection is narrowed as per the recommendations in Section 2.2.2 to reduce the crossing distance for pedestrians and to improve the visibility for pedestrians to observe approaching vehicles by bringing them away from the fence line. The ghost markings should be removed.

2.2.6 Pohutukawa Street intersection

At the Pohutukawa Street intersection there are areas of damaged pavement surface (see Figure 14 below) and some instances of redundant street furniture (see the now unused pedestrian waiting area in the median island in Figure 15).

The damaged pavement is causing ponding at the intersection, reducing the effectiveness of the pedestrian crossing line marking, as well as potentially having an impact on vehicle braking and stability in a braking and cornering area. The redundant pedestrian refuge may encourage pedestrian movements across Knights Road at this location, which presents a much higher safety risk than the adjacent pedestrian crossing due to the lack of driver awareness of this location and proximity to the intersection.



Figure 14: Slumping pavement surface leading to ponding at the Pohutukawa Street intersection



Figure 15: Redundant pedestrian refuge opposite Pohutukawa Street

It is recommended that as part of the Knights Road cycleway permanent solution that existing issues with the pavement are remedied and street furniture that is no longer needed is removed to create a long lasting, cohesive corridor treatment.

2.3 Oxford Terrace and Waterloo Station

2.3.1 Provision for cyclists after leaving The Beltway

When cyclists exit the new Beltway facility heading south towards Waterloo Station, they are required to make a choice between travelling on-road along Oxford Terrace (with a lane width of approximately 3.8m-4m southbound) through the roundabout or travelling through the Waterloo Station carpark and using the footpath outside Waterloo Station, which is signed as a shared zone (see Figure 16 and Figure 17 below).

There is also evidence of cyclists and pedestrians using the grassed berm to connect through to Waterloo station, however vehicles bonnets protrude over the berm due to the lack of wheel stops and narrow car park aisle width (see Figure 18).



Figure 16: Route option available for cyclists exiting The Beltway heading towards Waterloo Station



Figure 17: Example of the use of a 'Shared Zone sign on the footpath outside Waterloo Station



Figure 18: Narrow berm width with car's bonnets protruding along one side

It is understood that there is a concept design that shows an off-road cycleway facility that will connect the end of the existing Beltway cycleway through to Waterloo Station made possible by narrowing the lanes on Oxford Terrace. This will continue this high standard facility and remove the cyclist conflict with vehicles on the road or in the car park. In the interim, there is a need to improve the standard of facility for users of The Beltway to connect to Waterloo Station to mitigate this current conflict.

Given the frequency of reversing vehicles in the Waterloo Station carpark, the narrow aisle widths and the longer route, this is not the preferred route.

It is recommended that the planned off-road cycle facility is provided between the end of the Beltway and the Oxford Terrace roundabout, in advance of the works outside Waterloo Station, to complete this connection away from vehicle conflict. If this is not possible, an interim solution achieving a similar outcome could be explored with temporary kerb and flexi posts.

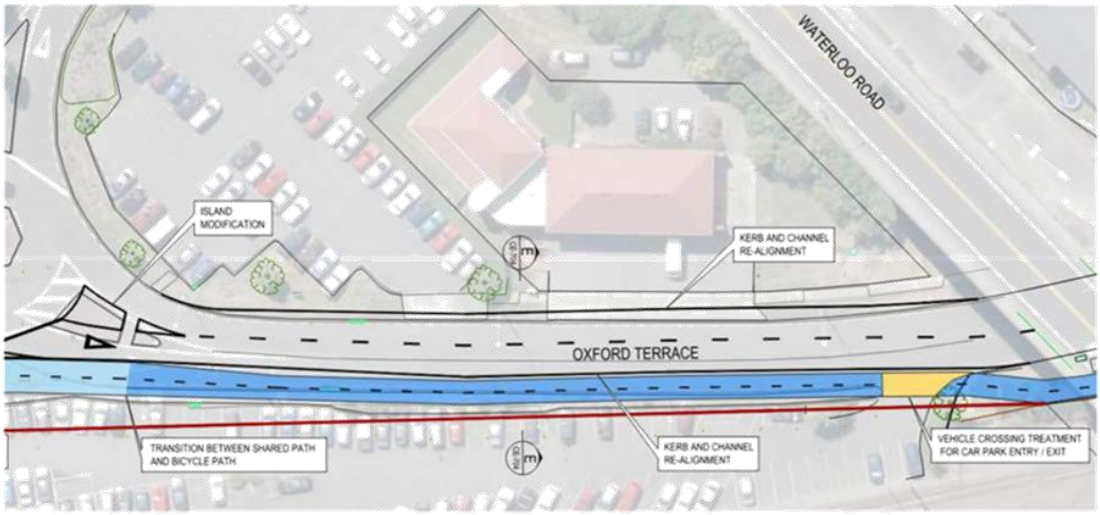


Figure 19: Section of the Waterloo Cycleway recommended to be advanced

2.3.2 Oxford Terrace Roundabout

At the Oxford Terrace roundabout, the deflection provided for left turning vehicles is minimal, as shown in Figure 20 below. This results in left turning vehicles making this manoeuvre at much higher speeds than the right turning movements, increasing the risk of a collision with both vehicles and pedestrians travelling to and from the car park on the north east corner.

In addition, the footpath facilities on some sides of the roundabout are limited. There are no footpath connections over the southern and western legs, and the footpath connection through the car park is not clear. This limits pedestrian accessibility in the area and encourages pedestrians to cross at locations where vehicles may not expect them.



Figure 20: Oxford Terrace roundabout

It is recommended that the vehicle speeds for the left turn movements are reduced through horizontal deflection (altered kerb alignments as part of The Beltway extension) or vertical deflection (raised platforms), particularly for the southbound left turn where there is conflict with pedestrians crossing and vehicles are approaching the slow speed Waterloo Station area.