

REPORT

REVIEW OF ROAD USER RULES FOR PEOPLE WALKING AND CYCLING

Prepared for NZ Transport Agency

September 2016



MWH

BUILDING A BETTER WORLD

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Executive Summary

MWH and ViaStrada were commissioned by the New Zealand Transport Agency to establish the necessary evidence to consider implementing the Road User Rules identified:

- Rule 1: Giving cyclists precedence over traffic when separated cycleways cross side-roads
- Rule 2: Giving pedestrians precedence over traffic when crossing side roads
- Rule 3: Allowing cyclists to use a left turning lane while riding straight ahead
- Rule 4: Allowing cyclists to undertake slow moving traffic
- Rule 5: Allowing cyclists to lane split when filtering to the front of a queue of traffic
- Rule 6: Allowing cyclists to turn left and/or ride across the top of a T intersection despite being faced with a red signal

The key tasks undertaken included:

- Background review of relevant literature and legislation, from both NZ and overseas
- Basic observation surveys of relevant road user behaviours at various Christchurch locations
- A review of network efficiency impacts of each Rule, using traffic modelling where necessary
- A review of road user safety impacts of each Rule, using crash data and other evidence
- An assessment of any issues regarding the implementation of the Rule, including traffic control devices and public education
- A recommendation for each Rule, having considered the various advantages and disadvantages identified

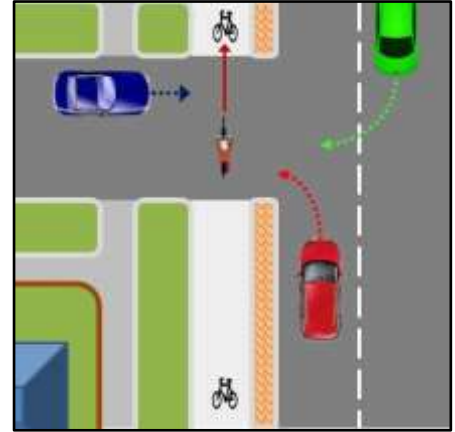
The draft findings were also presented to the Active Modes Infrastructure Group for feedback.

The following pages summarise the final findings and recommendations from these investigations. It should also be acknowledged that one of the key aims of these Rule changes is to encourage more walking and cycling in New Zealand, with all the resulting health, environmental and other benefits that would bring.

Rule 1: Giving cyclists precedence over traffic when separated cycleways cross side-roads

Brief overview of proposed change:

- People cycling on a separated cycle facility along a road corridor would have precedence over traffic entering or leaving side roads (signalised or priority-controlled)
- Vehicles turning across cycleways from the adjacent road would have to give way to the cyclist
- Traffic on side roads also obliged to give way to the cyclist



Likely advantages of proposed rule:

- Better consistency around the precedence for through-cyclists over turning traffic, regardless of where in the road corridor they are riding. Improved safety for cyclists
- Reduced delays for cyclists who do not have to legally wait for turning traffic when crossing priority-controlled side-roads
- Substantially reduced delays for cyclists traveling straight ahead from cycle paths at traffic signals. They currently have to have their own signal phase, which is normally allocated very little of the cycle time. In this case they can proceed on the green signal for all vehicles

Likely disadvantages of proposed rule:

- In some locations (especially where high cycle volumes and few pedestrians) turning motor vehicles would have additional delay. In most cases, this increased delay would be insignificant
- In limited cases, increased delay to through motor vehicles, where delayed turning vehicles block through traffic lanes. This delay would be more pronounced when turning or through traffic movements are high and on narrow roads

Notable implementation issues:

- While priority to through cyclists may be intuitive when a cycle path is installed right next to traffic lane (as many motorists give way when turning now) it would be less intuitive when cyclists are on a path that is separated by a berm from the traffic lane. In such circumstances it would be best to use marking and possibly signage to reinforce that cyclists have precedence. In addition, at shared paths it is best to always mark and sign priority to cyclists and pedestrians (as recommended in Rule 2)
- Should a rule change be implemented universally across New Zealand (with signed exemptions) or only at sites where newly introduced signs/markings allow this?

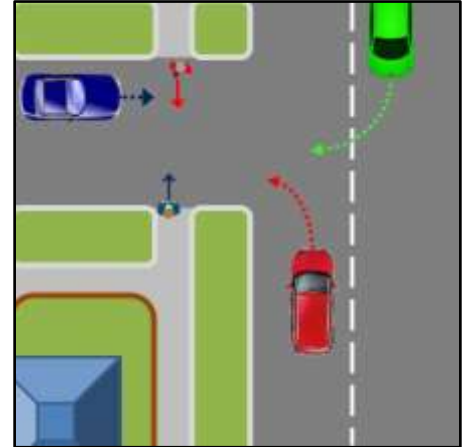
Recommendation for this rule:

- Give priority for crossings at **signalised intersections universally across New Zealand** via a change to the Road User Rule (unless signs or signal phasing prohibit it at certain locations)
- Priority across unsignalised intersections should be **either universally across NZ or only where signs/markings allow it**, possibly only in lower-speed (urban) areas.
- For shared paths where pedestrians are also crossing, then the recommendations as per Rule 2 (pedestrian precedence at intersections) should apply.
- A key change needs to occur around the definition of “roadway”. The roadway needs to include all cycle paths and cycle lanes, regardless of the form of separation (although, as noted above, supplementary treatments may be required where the cycle path is not obvious to road users).

Rule 2: Giving pedestrians precedence over traffic when crossing side roads

Brief overview of proposed change:

- Pedestrians walking alongside a road corridor who wish to cross would have precedence over traffic entering or leaving a side-road.
- The pedestrian priority could apply only when the pedestrian crosses from one footpath (or shared path) adjacent to the main road to the continuation of that footpath on the opposite side of the side road.
- This rule would not apply to traffic signals (where rules about pedestrian signals already cover this) and roundabouts.



Likely advantages of proposed rule:

- Reduced delays to crossing pedestrians, making walking more attractive as a mode
- Increased safety and protection for pedestrians when crossing side-road, once rule change has been bedded in for a period (with required strong publicity campaign)
- Drivers will become more cautious and alert at such intersections, especially where there are a lot of pedestrians about

Likely disadvantages of proposed rule:

- The consequence of error and collision by motorists, will typically impact a lot more on the safety of the vulnerable crossing pedestrian, even if the pedestrian has precedence. If adopted across the entire road network, could have quite a negative effect on pedestrian safety, at least initially, until drivers get accustomed to the new rule
- Traffic queued to wait for pedestrians to cross may block main-road through-traffic

Notable implementation issues:

- The crash risk if drivers don't yield on high speed roads is more likely to cause a serious or fatal crash, even with lower turning speeds. Therefore, consider only applying to lower-speed (urban) areas
- Can the same effect as this Rule be achieved by greater use of existing markings for zebra crossings?
- Should cross-roads be included as vehicles travelling straight through will have higher speeds than turning vehicles? If they are excluded, what would that do for user understanding (different rules apply at different intersection configurations)?
- Some pedestrians may think that the rule change also gives them precedence over main road traffic

Recommendation for this rule:

- Do not adopt this rule universally at this stage without the presence of suitable signs/markings
- **Implement initially at limited trial sites in New Zealand** via the introduction and legislation of new signs/markings to allow this, ideally at very low-speed (30-40 km/h) areas first
- Monitor behaviours/performance of trial sites for consideration of wider uptake

- Shared paths (shared between cyclists and pedestrians) should be included under this rule, to ensure consistency with Rule 1. New marking and signage will be required to provide precedence across side-roads over turning traffic

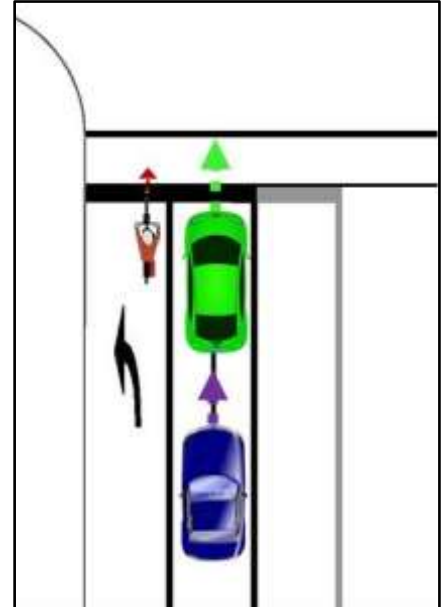
Rule 3: Allowing cyclists to use a left turning lane while riding straight ahead

Brief overview of proposed change:

- People cycling would be able to use a traffic lane marked for turning left or right at an intersection to proceed straight ahead instead

Likely advantages of proposed rule:

- Cyclists can avoid riding in a narrow adjacent through-lane where other motor traffic may be travelling through at reasonable speed
- Reduced conflicts between through-cyclists and adjacent through-traffic
- Minimises the need to fit in separate cycle lanes at every location, particularly in narrow roadway cross-sections (*without excusing RCAs from making adequate efforts to provide distinct cycle facilities when feasible*)
- Legitimising an already common practice by many riders (typically done for their safety)
- Negligible effect on the efficiency of road users, due to the fact that existing behaviour would be legalised, i.e. no change in user behaviour influencing efficiency can be expected
- Negligible effect on safety, as the majority of cyclists already use the left turn lane to cycle straight ahead. Any increase in crashes due to more left-lane use is expected to be outweighed by the reduction in conflicts that occur with faster moving traffic in the through lane



Likely disadvantages of proposed rule:

- No notable identified problems

Notable implementation issues:

- Some education required to inform road users (motorists as well as cyclists) that this behaviour is now permitted for cyclists. It might also be worth educating through-cyclists not to stay on the kerb side of a turn lane, to avoid misleading other road users about their intentions
- At sites with dual turn lanes, allow cyclists to only use the lane immediately nearest to the through lanes (or disallow this behaviour altogether at dual turn lanes)
- Intersections with separate turn phases while through-traffic is stopped (a reasonably commonplace occurrence) may need prohibiting of stopping in the turn lane, or to require that, where practicable, any riders using a turn lane to go straight ahead do not block the passage of any other vehicles legally allowed to turn

Recommendation for this rule:

- **Implement universally across New Zealand** via a change to the Road User Rule
- Introduce exception sign where the practice is not appropriate, e.g. "LEFT LANE MUST TURN LEFT"

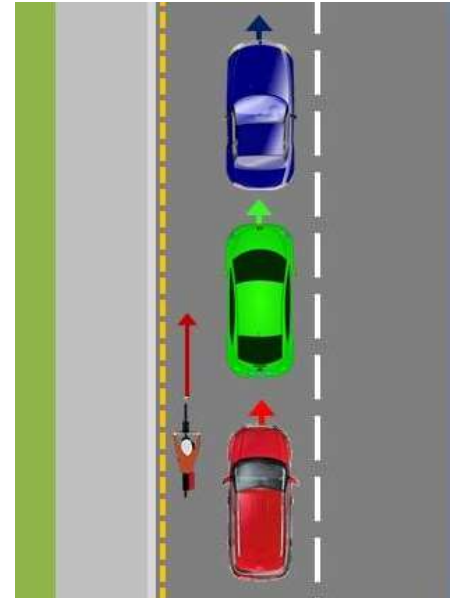
Rule 4: Allowing cyclists to undertake slow moving traffic

Brief overview of proposed change:

- People cycling alongside other slow-moving traffic in the same lane would be able to pass them on the left hand side (also known as “undertaking”)

Likely advantages of proposed rule:

- Allow cyclists to get past slow-moving traffic to advanced cycle storage facilities
- Allow cyclists to ride at their desired pace instead of being held up by slow-moving traffic
- Legitimising an already widespread practice by many riders (typically done for practical reasons)
- Eliminate the inconsistency implied by the current legislation (can pass when traffic is stopped, but not when it is moving)
- Negligible effect on the efficiency of road users, as generally cyclists are riding alongside motorists in this scenario, so they are not impeding their progress



Likely disadvantages of proposed rule:

- Some turning traffic might be slightly impeded if they have to wait for a cyclist to pass first; however, many may already be waiting for any approaching cyclists now, irrespective of the law
- Moderate effect on the safety of road users, due to drivers in the slow moving queue leaving a gap for opposing drivers to turn through, and these opposing drivers not seeing or thinking to look for cyclists. This is already a problem for cycle and bus lanes adjacent to slow moving queues, and is an even bigger problem for moped and motorbike riders due to their higher speeds
- Possible problems with drivers travelling in the same direction as cyclists, who might turn left or make a lateral shift in position without checking first to their left side for cyclists.
- Allowing cyclists passing on the left may reduce the caution taken by many riders in this situation (and some may possibly increase their riding speed)

Notable implementation issues:

- Potential risks from crossing traffic could be reduced by further marking of cycle conflict areas across side roads (coloured surfacing, cycle symbols), or by improving inter-visibility between right turning drivers and two-wheeled riders (e.g. setting queued traffic back with hold lines)
- Not necessary to trial this first at designated sites; in practice, this change of rule can already be achieved by marking a cycle lane in the desired location
- Public education informing motorists of their obligations when travelling along or turning across potential cycling routes and reminding cyclists to still take care when crossing such conflict points

Recommendation for this rule:

- **Implement universally across New Zealand** via a change to the Road User Rule, possibly only in lower-speed (urban) areas, or by requiring a maximum speed limit for cyclists undertaking this behaviour. Consider also prohibiting cyclists from passing vehicles that have adequately signalled a left turn at intersections and driveways.

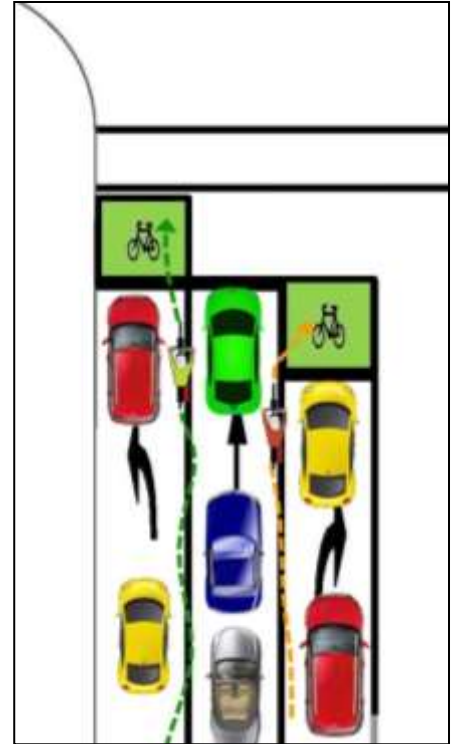
Rule 5: Allowing cyclists to lane split when filtering to the front of a queue of traffic

Brief overview of proposed change:

- People cycling would be able to ride between two lanes of traffic, typically following the lane line (also known as “lane splitting” or “filtering”)

Likely advantages of proposed rule:

- Allow cyclists to get through queued traffic to advanced cycle storage facilities
- Let cyclists get into a more visible position with respect to adjacent motorists
- Allow cyclists to ride at their desired pace instead of being held up by slow-moving traffic
- Eliminate the ambiguity implied by the current legislation (passing on right allowed, passing on left not allowed)
- Legitimising an already widespread practice by many riders (typically done for practical reasons)



- Negligible effect on the efficiency of road users, due to the fact that the practice is already quite prevalent and has only limited potential to affect the movement of other road users

Likely disadvantages of proposed rule:

- A major concern is that the space available when traffic is stationary may be reduced in moving traffic to the point that cyclists might be crushed between vehicles. Of particular concern is that this may lead to serious and fatal crashes, especially if heavy vehicles are involved. This may occur within the blind spots of such vehicles.

Notable implementation issues:

- Less confident cyclists are not as likely to adopt lane splitting behaviour even if it were legalised
- Likely that behaviour of people cycling and driving would change very little from current practice
- More frequent lane-splitting behaviour by cyclists, and possibly higher passing speeds by some riders, could potentially be mitigated by specifying that adequate care be taken when carrying out this manoeuvre or by specifying a maximum speed for cyclists making this manoeuvre
- Not necessary to trial this first at designated sites; in practice, this change of rule could already be achieved by marking a cycle lane in the desired location
- Public education informing motorists of their obligations when travelling along or turning across potential cycling routes and reminding cyclists to still take care when crossing such conflict points or making their way between traffic
- The introduction of a cyclist lane-splitting rule may increase calls to do the same for motorised two-wheelers, although it is acknowledged that the speeds involved can be somewhat greater

Recommendation for this rule:

We do not recommend this rule be **Implementing universally across New Zealand.**

We also do not recommend this rule be trialled in New Zealand. Rather we would suggest that any decision to implement this rule wait on the outcome that results from Rule 4.

Rule 6: Allowing cyclists to turn left and/or ride across the top of a T intersection despite being faced with a red signal

Brief overview of proposed change:

- People cycling would be allowed to make a left turn at a signalised intersection (“Rule 6L”), or travel across the “top” of a signalised T intersection (“Rule 6T”), at any time (after first checking that their way is clear)

Likely advantages of proposed rule:

- Allowing riders to avoid potential conflicts with adjacent traffic downstream of the intersection
- Reducing (arguably unnecessary) delays to riders, thus further encouraging cycling
- Legitimising a somewhat prevalent practice by many riders (often done for safety reasons)
- SIDRA modelling found no noticeable efficiency delay to motorists, but greatly reduced delays and queue lengths for cyclists

Likely disadvantages of proposed rule:

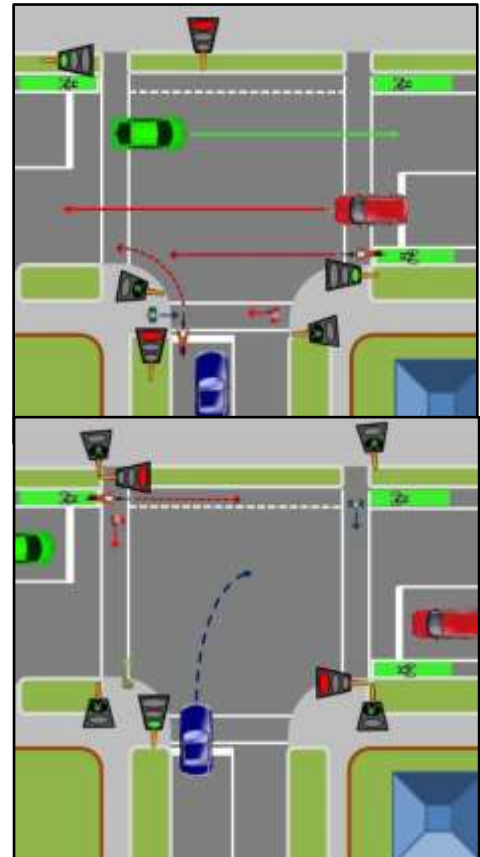
- Negligible to slight effect on the safety of road users. Potential increase in crashes between red-light running cyclists and other moving traffic entering the same leg may be counteracted by the **reduction** in crashes between those cyclists and adjacent motorists on the same approach leg had they chosen to wait until the general green signal
- Cyclists required to give way to legally crossing pedestrians; may be some conflicts there

Notable implementation issues:

- Some new signage would be required to allow for exceptions to the general Rule, either allowing or prohibiting it
- Likely that more people biking would make the “turn on red” manoeuvre with a new Rule. Pedestrians may be slightly more wary when crossing intersections
- Should red-light running cyclists be required to come to a complete stop first and check that the way is clear before moving off, or simply “proceed cautiously and give way to other priority users”?
- Consider allowing right turns on red where a cyclist approaches an intersection on the right-hand side of a one-way street and turns into another one-way street
- Some riders could attempt to use this rule to travel straight through an intersection, by first turning left into the side road, doing a U-turn, and then turning left out of the side road

Recommendation for this rule:

- **Implement initially at limited trial sites in New Zealand** via the introduction and legislation of the appropriate signs to allow this. Suggest trialling only in lower speed areas first.
- Monitor behaviours/performance of trial sites for consideration of wider uptake.



NZ Transport Agency

Review of Road User Rules for People walking and cycling

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Introduction

MWH and ViaStrada were commissioned by the New Zealand Transport Agency to establish the necessary evidence to consider implementing the Road User Rules identified:

- Rule 1: Giving cyclists precedence over traffic when separated cycleways cross side-roads
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- Rule 6: Allowing cyclists to turn left and/or ride across the top of a T intersection despite being faced with a red signal

One of the key aims of investigating these Rule changes is to encourage more walking and cycling in New Zealand, by making walking and cycling safer, more equitable and more attractive mode choice options. In line with the Government's strategic direction, the Transport Agency acknowledges the various resulting health, environmental and other benefits that increasing mode share for walking and cycling would bring.

The key tasks undertaken included:

- Background review of relevant literature and legislation, from both NZ and overseas.
 - Research and evidence from similar road rule changes elsewhere, where legislation in other jurisdictions is applicable to New Zealand.
 - As well as general searches, investigations were guided by knowledge of related initiatives elsewhere, e.g. introduction of new French cycling road rules and contact with research colleagues overseas.
- Basic observation surveys of relevant road user behaviours at various Christchurch locations.
 - To establish some indicative measures of current road user behaviours related to the Rules under investigation and supplement evidence obtained from the literature review.
 - Data captured directly by on-site survey over brief periods (up to two hours per site).
- A review of network efficiency impacts of each Rule, using traffic modelling where necessary.
 - Preliminary assessments identified that only Rules 1, 2 and 6 may have some significant effect (positive or negative) on travel times and delays for road users. The efficiency effects of Rule 2 have already been assessed (Koorey & McCrostie 2015¹). SIDRA modelling was undertaken to test a variety of motor vehicle and cyclist volume combinations in scenarios relating to Rules 1 & 6.
 - For the other rules, a general discussion of the efficiency effects (or lack thereof) was deemed sufficient.
- A review of road user safety impacts of each Rule.
 - An attempt to identify, to the extent possible given the limitations of available data, the likely safety impact (positive, negative or neutral) of introducing each Rule to New Zealand.
 - Exploring the existing and potential crash patterns associated with each Rule, using crash data analysis, literature search, and first-principles assessment.²
 - Focussing on Rules 1 and 4, based on findings from preliminary assessments. (Rule 2 crashes already analysed by Koorey & McCrostie 2015), with other Rules appearing to have relatively negligible safety concerns.
- An assessment of any issues regarding the implementation of the Rule

¹ Koorey G., McCrostie C. (2015). "Feasibility of Implementing International Pedestrian Crosswalk Laws in New Zealand", *IPENZ Transportation Conference*, Christchurch, Mar 2015, <http://ir.canterbury.ac.nz/handle/10092/10959>

² Note that the limitations of time and resources precluded us from examining individual crash reports in detail. We were therefore reliant on interpretation of aggregate crash data records and a previous dataset of fatal cycle crashes. Care should be taken not to read into the crash numbers presented a definitive answer to the prevalence of relevant crashes.

- including new / modified traffic control devices and public education programmes required.
- A recommendation for whether / how to proceed with each Rule, having considered the various advantages and disadvantages identified.
 - Consideration was given to options for packaging the proposed Rule changes, recommendations for improving crash data recording, and suggestions for other potentially related possible Rule changes.
- Presentation of preliminary findings in August 2016 to the Active Modes Infrastructure Group (AMIG) convened by the Road Controlling Authorities Forum and the Transport Agency.
 - Minor amendments and clarifications were made to the report content as a result of AMIG feedback, including: differentiation between “precedence/priority” and “right of way”, the effect on motorist antagonism of legitimising cyclist behaviours, and the potential under Rule 6 for allowing cycling during pedestrian phases.

This report details the final findings and recommendations from these investigations.

1 Rule change 1: Giving cyclists precedence over traffic when separated cycleways cross side-roads

1.1 Overview of proposed Rule change

Under this Rule change, people cycling on a separated cycle facility³ along a road corridor would have precedence over traffic entering or leaving side roads (signalised or priority-controlled), in the same way that someone cycling on the main roadway does. Otherwise, there is the potential for conflict between road users (see Figure 1-1 and Figure 1-2). For clarity, we will consider this Rule as two separate options; one for signalised intersections (hereon referred to as “Rule 1S”, see Figure 1-3) and one for priority-controlled intersections (“Rule 1P”, see Figure 1-4), including roundabouts.



Figure 1-1: Conflict between left turning vehicles and cyclists travelling straight from kerbside separated cycleway (Wellington)

³ For the purposes of this discussion, a “separated cycle facility” or “separated cycleway” will include any infrastructure (path or lane) intended for cyclists that is parallel to but physically separated from the main roadway in some way (kerb, island, vertical posts, etc). It will include consideration for now of shared (pedestrian/cycle) paths, although these will be discussed specifically later.



Figure 1-2: Potential for conflict between left turning vehicle and cyclist travelling straight from separated cycleway (Adelaide, Australia)



Figure 1-3: Potential for conflict between left turning (heavy) vehicle and cyclist travelling straight from separated cycleway (Christchurch)



Figure 1-4: Two-way separated cycleway (Nelson) with priority ceded to side-road

Under the current rules, the cyclist represented in Figure 1-5 would have to give way to any of the three vehicles crossing the path of the separated cycleway, irrespective of the degree of separation provided or of any markings across the side road.

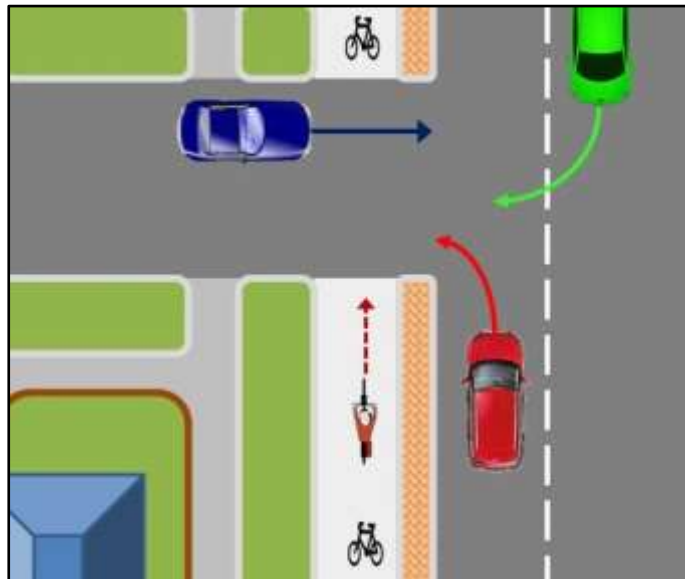


Figure 1-5: Existing rules regarding giving way to cyclists⁴

Under the proposed change (Figure 1-6), the vehicles turning across the cycleway from the adjacent road would have to give way to the cyclist. Furthermore, traffic on the side road would also be obliged to give way to the cyclist, as per the “top of the T” give way rule:

⁴ Note that the diagrams of this nature presented throughout this report are indicative only, and do not represent the full range of situations that may be affected by the proposed rule change or possible associated road treatments and markings.

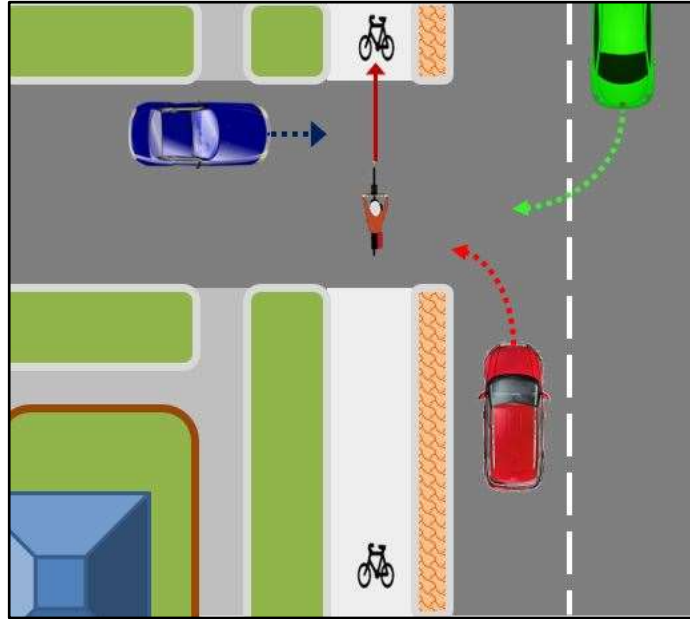


Figure 1-6: Proposed rule for traffic entering or leaving a side road

Note that there are safety hazards associated with cycling in the opposite direction to the adjacent roadway, therefore there may be greater implications of a rule change if two-way cycleways are involved in this situation. This will be investigated later in the report.

1.2 Likely benefits of the Rule change

The expected benefits from introducing this Rule would include:

- Better consistency around the precedence for through-cyclists over turning traffic, regardless of where in the road corridor they are riding
- Reduced delays for cyclists who do not have to wait for turning traffic when crossing side-roads - a key issue at traffic signals where cyclists are often allocated a very short time in the cycle to travel straight through
- (In the long run) improved safety due to greater care and slower speeds exhibited by turning drivers
- Greater ability by RCAs to provide separated cycleways that appeal to a wide range of people whilst providing priority and minimal delay
- May encourage further investment in new facilities if cyclist priority is provided

These (and any identified concerns) are discussed in more detail below.

1.3 Existing NZ Legislation

The existing section of the Land Transport (Road User) Rule covering giving way at priority-controlled and uncontrolled intersections (Part 4) refers to “drivers approaching or entering an **intersection** on a **roadway**”.

Section 1.6 of the Land Transport (Road User) Rule states: “**roadway** means that portion of the road used or reasonably usable for the time being for vehicular traffic in general.” Meanwhile, an **intersection** is defined by “2 or more intersecting or meeting roadways”.

In practice, this generally means that a roadway is the part of the road between kerbs or edges of seal. An off-road cycleway (e.g. a cycle path or shared path) is not considered roadway, and there is also legal opinion in NZ that suggests that a cycleway at carriageway level with some physical separators (e.g. posts or kerb islands) may not be part of the roadway either. The Road User Rule gives the following definitions (**emphasis** added):

*cycle lane: means a longitudinal strip **within a roadway** designed for the passage of cycles*

cycle path:

(a) means part of the road that is **physically separated from the roadway** that is intended for the use of cyclists, but which may be used also by pedestrians; and

(b) includes a **cycle track** formed under section 332 of the Local Government Act 1974

[Note that a “cycle track” is not explicitly defined in the Local Government Act 1974 or anywhere else]

The Road User Rule does not define a “shared path”, but the Traffic Control Devices Rule does:

*shared path: means an area of road, **separated from a roadway**, that may be used by some or all of the following persons at the same time: pedestrians, cyclists, riders of mobility devices and riders of wheeled recreational devices.*

Interestingly, there is no similar requirement for separation in the definition of a “footpath”. There is also as yet no definition of what exactly constitutes sufficient “separation” to the point that a cycleway is no longer “for vehicular traffic in general” and thus not within the roadway.

Common law rulings typically state that anybody entering a roadway gives way to traffic already on a roadway, but we have not found any specific NZ case law that states this. Road User Rule 4.4(2) states that “A driver exiting a driveway must give way to a vehicle on a roadway”, but otherwise the legislation is silent in regards to entering a roadway from anywhere else. It should be noted however, that the Crash Analysis System has a factor code for “failed to give way entering roadway not from driveway or intersection” (factor code 312), which suggests that there is a requirement to give way.

This suggests that drivers exiting from a priority-controlled side road are not legally required to give way to cyclists coming from a separated cycleway and crossing the side road, as the separated cycleway is not considered part of a roadway (Rule 4.1).

Meanwhile, the law for drivers turning **into** a side road is ambiguous, as the relevant Rule (4.2) does not refer to “roadways”; e.g. Rule 4.2(2) states “A driver changing lanes or about to change lanes, or turning or about to turn, must give way to any vehicle not changing lanes, or not making a turn”. This conforms to the general road user expectation that turning traffic gives way to non-turning traffic. However, it is complicated by being in proximity to other clauses that refer to “intersections”. Thus, it is not explicitly clear that separated cycleways are included in this Rule.

The current situation has also been inconsistent with legislation regarding crossing driveways since changes drafted in 2011 came into effect. Section 4.4(1) of Land Transport (Road User) Rule states that “A driver entering or exiting a driveway must give way to a road user on a footpath, cycle path, or shared path” (note that this appears to be irrespective of the relative legality of them being here; e.g. a cyclist illegally riding on a footpath still has precedence).

It may be more useful to define a roadway as simply being usable “for vehicular traffic (including cyclists)” (i.e. without the “in general” modifier); this would allow roadways that are only available to certain groups of vehicles (e.g. separated cycleway or busway) to still come under the relevant intersection rules (NB: for the avoidance of doubt, explicit exclusion of driveways from the definition of roadways may be required). While this modified definition would also allow facilities like shared pathways (unless explicitly excluded) to be considered roadways, the existing intersection give way rules would not apply to pedestrians, as they only refer to “vehicles” (*notwithstanding that Rule change 2 of this report is separately considering changes to pedestrian priority*).

Part 3 of the Land Transport (Road User) Rule controls operations at **signalised intersections**. Section 3.2 states (**emphasis** added):

(1) While a green signal in the form of a disc is displayed,—

(a) a driver facing the signal may proceed straight ahead or may turn left or right at an intersection unless a red signal in the form of an arrow or a special sign prohibits that movement:

(b) a driver facing the signal, including a driver turning left or right, must—

(i) proceed with due regard to the safety of other road users; and

(ii) give way to pedestrians, riders of mobility devices, and riders of wheeled recreational devices lawfully crossing or about to cross the roadway; and

(iii) give way to motor vehicles and **cycles lawfully proceeding straight ahead**:

(c) a driver facing the signal and turning right must give way to vehicles approaching from the opposite direction and lawfully turning or about to turn left.

This would suggest that, at signalised intersections, through-cyclists may already enjoy a legal priority over turning traffic, regardless of what type of cycle facility they approached from. The crucial factor is probably whether cyclists are considered to be “lawfully” proceeding straight ahead, e.g. is a cyclist on a separated facility allowed to go when a green signal is displayed? It is also not clear whether there is still a requirement by cyclists to yield to others when entering a roadway from an “off-roadway” location - the transport legislation is silent on this and no common law appears to be relevant.

Complicating the matter further is the fact that currently there is no requirement for separated cycleways at a signalised intersection to be controlled by signals; clause 6.2(1) of the Traffic Control Devices Rule only requires signals be installed for each “roadway” approach, and optionally for each driveway. Additionally, the relevant section of the Rule discussing cycle signals, clause 6.4(12), only refers to their need when a “cycle lane” (but not a cycle path or shared path) has separate signal phasing. In summary, the legal situation is currently rather ambiguous and probably needs clarifying, e.g. including cycleways under the definition of “roadway” would help to resolve matters.

Giving way at **roundabouts** is covered by Land Transport (Road User) Rule 4.6, stating:

(1) A driver entering a roundabout must give way to traffic on the roundabout and to traffic approaching from the driver’s right.

The Rule is silent on consideration of roadways at roundabouts, so could equally apply to interactions between entering motorists and cyclists crossing on adjacent separated cycleways (at least, from the right). The Rule also does not cover the situation of traffic *exiting* a roundabout, so the previously discussed obligation for turning traffic to give way to non-turning cyclists (Rule 4.2(2)) could arguably equally apply here. Again, the potential for ambiguity may better to be resolved more definitively.

It is noted that the proposed *Land Transport Rule: Omnibus Amendment 2016* initially included a proposal to expand the definition of “intersection” to include “*a place where a cycle path or a shared path crosses a roadway*”. However, this clause was retracted during the review process. It could be argued that such a clause would be sufficient to affirm the same give-way rights as roadway users to separated cycleway users under the existing Give Way provisions (Part 4 of the Road User Rule, particularly sections 4.1 and 4.2). If it was thought necessary, relevant clauses in the Road User Rule could be added or amended to clarify this situation.

1.4 Other Relevant Literature/Legislation

In Queensland, Australia, the road rules require drivers turning at an intersection with traffic signals to give way to “*any rider of a bicycle at or near the intersection who is crossing the road the driver is entering on a marked foot crossing*” (Rule 62⁵). It should be noted that these Rules are not found in the general Australian Road Rules and appear to reflect the fact that Queensland allows cyclists to ride on footpaths and use pedestrian crossings. Victoria are also considering updating their Rule 62 so that drivers turning at an intersection with bicycle crossing signals must give way to cyclists crossing the road the driver is entering (Tierney 2015⁶). The same principle doesn’t appear to apply at priority-controlled intersections in Australia; whilst the legislation does require drivers to give way to vehicles *entering* the intersection (with “vehicles” including bicycles), the definition of an ‘intersection’ (“*where two or more roads meet*”) doesn’t appear to include where a separated cycleway meets a road.

Under the 1968 Vienna Convention on Road Traffic⁷ (ratified by 74 countries, particularly in Europe, but not New Zealand), turning motorists are subject to Article 16:

*2. While changing direction, the driver shall, ...allow oncoming vehicles on the carriageway he is preparing to leave, and cycles and mopeds **moving on cycle tracks crossing the carriageway he is about to enter, to pass.***

⁵ Queensland Govt, 2015. Transport Operations (Road Use Management - Road Rules) Regulation 2009; amendments 2015.

⁶ Tierney, Paul. 2015. Review of Victorian Cycling Related Road Rules and Legislation. Summary Report for VicRoads. Victoria, Australia.

⁷ United Nations. *Convention on Road Traffic*, Vienna, 8 Nov 1968, Economic Commission for Europe.

In the UK, separated “cycle tracks” don’t have precedence over turning traffic by default. However, give-way markings (parallel dashed lines, defined in “diagram 1003”) can be used to create such a priority, under the Traffic Signs Regulations and General Directions 2002⁸:

25.—(1) The requirements conveyed to vehicular traffic on roads by the road marking consisting of the transverse lines shown in diagram 1003 shall be as follows.

*(6) Where the transverse lines are placed in advance of a length of the carriageway of the road **where a cycle track crosses the road** along a route parallel to the transverse lines, then the requirement shall be that no vehicle shall proceed past such one of those lines as is nearer the cycle track, in a manner or at a time **likely to endanger any cyclist proceeding along the cycle track** or to cause such a cyclist to change speed or course in order to avoid an accident.*

Of particular interest is the fact that the same Regulations also prescribe the road design that must accompany these give-way markings (Schedule 19):

*34. (2) The marking shown in diagram 1003 may **only** be placed on the carriageway of a road in circumstances such that regulation 25(6) (transverse lines placed in advance of a cycle track crossing a road) applies, if the length of the road which is crossed by a cycle track consists of a **road hump** extending across the full width of the carriageway...*

1.5 Existing Observed Practice in NZ

Currently, it is not very common (but not unknown) to observe turning traffic giving way to people cycling on an adjacent separated cycleway (which they technically don’t have to). The prevalence does seem to depend somewhat on the relative level of separation. It is not clear whether the form of intersection control would influence driver behaviour (although some traffic may be turning at a signalised intersection from a stopped position).

The flexible plastic bollards on the Antigua Street and Strickland Street approaches to Brougham Street could be considered enough to prevent general traffic from entering the cycle lane and therefore the cycle lane would no longer be part of the “roadway”. However, it should be noted that road users are likely to perceive this form of separation as being quite different to more extensive forms, for example concrete kerb separators. Preliminary field observations on these approaches found that, where there was potential for conflict, the majority (5 out of 6) of left-turning drivers gave way to cyclists travelling straight through (Appendix D). Note that a much greater number of cyclists were observed to travel through the site without potential for conflict, due to the traffic in the adjacent lane (a shared through and left turn lane) also travelling straight through the intersection. Of the five instances where a driver gave way to a cyclist, three were at the start of a green signal and the other two were during the green phase.

1.6 Effects on Network Efficiency

The potential efficiency impacts of this proposal are:

- Reduced delays to through-cyclist(s) who do not have to stop or slow to a crawl to determine if a driver is turning, or wait for turning/crossing traffic to go first.
- Delays to turning traffic on the main road who have to wait for a through-cyclist(s) to cross their path.
- Delays to through traffic on the main road who are held up in the same lane as turning traffic
- Delays to traffic on the side-road who have to wait for a main-road cyclist(s) to cross.

It is important to note however, that the presence or not of this Rule change may influence whether or not a separated cycleway would be provided in the first instance. Without this Rule change, there is likely to be a greater tendency to provide on-road cycle lanes where cyclists already have precedence over turning traffic.

It is expected that a change in the Road User Rule to allow this behaviour would have a moderate effect on the efficiency of road users, assuming that the same separated cycle facility is provided in either case. The significance of the effect will depend on how busy the intersection is to begin with. If an

⁸ UK Government. The Traffic Signs Regulations and General Directions 2002.
<http://www.legislation.gov.uk/uksi/2002/3113/made>

intersection is not performing well, with long delays for some movements, then the introduction of this rule would only exacerbate that delay further.

However, if a cycle facility was running parallel to a busy arterial road and passed through a signalised intersection, the amount of delay might not be as great as first envisaged. If the facility is an on-road cycleway separated from the main road traffic by an intermittent kerb or vertical posts, the cyclists will generally be deemed under the control of the traffic signals of the intersection. Therefore, cyclists will need to queue on a red signal and proceed only when given green signal precedence. This would have a similar effect to pedestrians on the side road, whom will have precedence over all traffic due to the green pedestrian signal. Any other cyclists who pass through the intersection on a green (without having stopped), may often be riding parallel to a through vehicle, therefore not opposing any right turning vehicle wishing to turn across the traffic (as the through vehicle provides the opposition to the turner). On some occasions though, a cyclist will act as the opposing through vehicle for the right turning traffic. This is most likely not too different to how things exist on cycle networks currently.

SIDRA modelling of a signalised crossroad intersection was used to consider the effects on traffic performance of introducing Rule 1S. This rule change was considered in isolation to the other proposed rule changes being considered in this report. The effects of changing this Rule at a priority-controlled intersection (Rule 1P) were not modelled, as it is envisaged that generally lower traffic volumes would be present in this case, leading to lesser effects than a signalised intersection.

It must be noted that the ability to model a separated cycling facility in SIDRA is quite limited. In the examples modelled, the cycling facility layout was treated the same (dependent on the priority scheme chosen), whether it was fully separated behind a berm or located adjacent to the motorised vehicle lanes in its own separate facility. The difference between the two types in terms of signal phasing is that the former will need to operate during a separate signal phase to (currently) receive priority, and the latter can be included with the signals for the motorised traffic as a filter turning arrangement.

There were also five different scenarios modelled as follows;

1. The existing situation where cyclists have to give way to turning traffic
2. Cyclists have priority, but are not protected by phasing from turning traffic
3. Cyclists are protected with separate phasing from turning traffic, but go with through-traffic
4. Cyclists have an advanced green signal phase (i.e. starts before general traffic)
5. Cyclists have a separate green phase from all traffic.

The following assumptions/baselines were used for all models;

1. A cycle facility was provided only on the main north-south road of the intersection.
2. 50 cyclists per hour would travel on each approach, with directional splits consistent with motorised traffic.
3. A simple two-phase signalling was used, except where a third separate phase was necessary either for cycles only, a phase for right turn traffic from the north-south approaches, or an advance cycle priority.
4. The SIDRA default of 50 pedestrians per hour was left unchanged.
5. The cycle facilities are one-directional only. Contra-flow facilities were not modelled.
6. A traffic split of 60/40 in favour of north-south traffic over east-west traffic.
7. The north-south direction was the busiest flow, simulating tidal peak hour flow.

As previously mentioned it is not straightforward to create a separated cycle facility in SIDRA. In order to attempt to create this, the cycle facility must use its own approach so that priorities can be properly assigned to recreate the proposed changes. It is for this reason that the SIDRA layout looks peculiar in, Figure 1-7 but functionally it operates as envisaged.

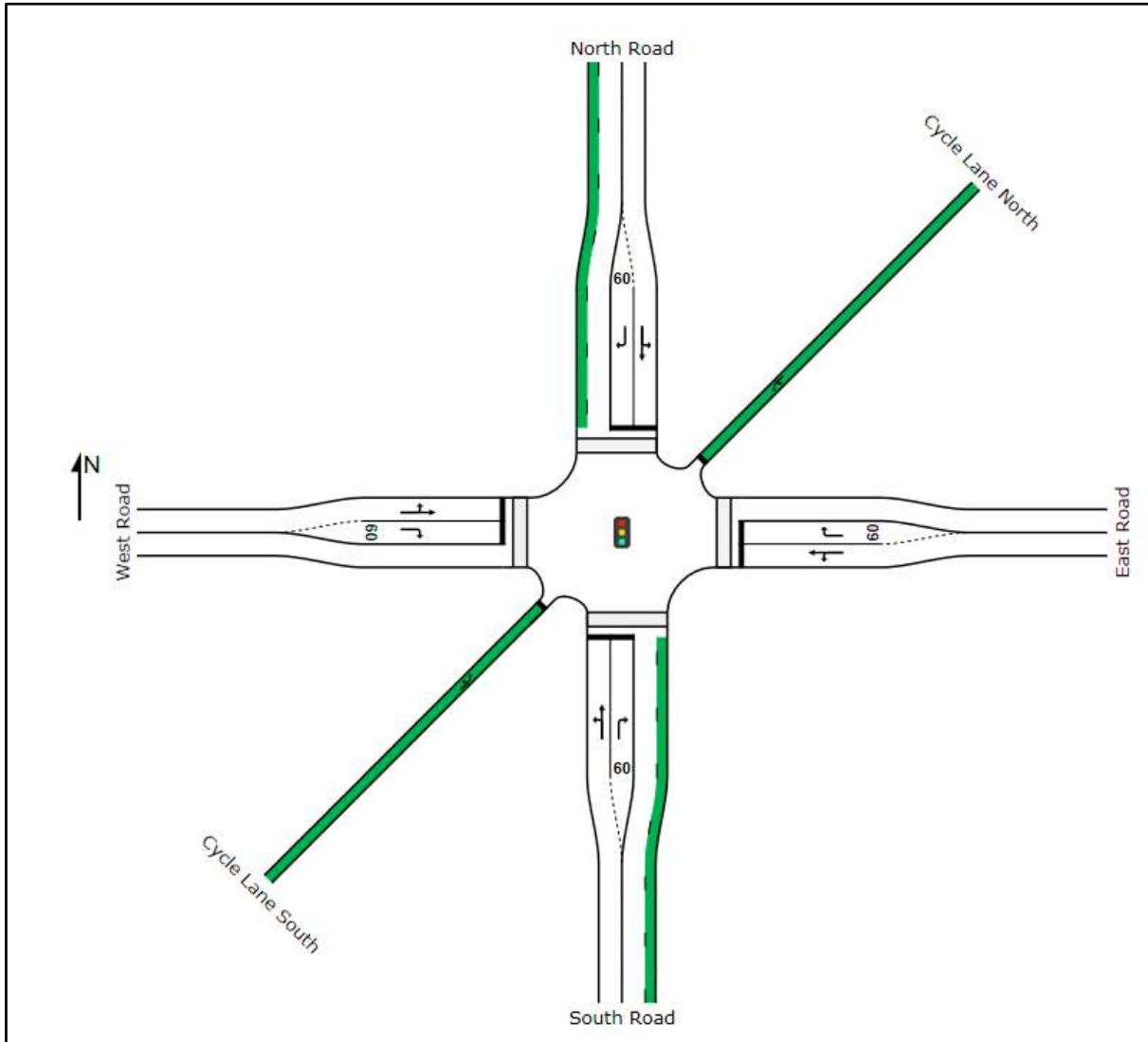


Figure 1-7: SIDRA layout modelled for proposed Rule 2 change

The NE and SW cycle facilities are not set up to not interact with each other; instead, approach cyclists on the SW cycle facility are directed to the northern departure lane and vice versa for the NW approach cyclists.

The modelling outputs for each scenario modelled are as follows in Table 1-1. The table includes arrows to indicate if a metric increased or decreased in the proposed scenario.

NB: The colour coding of green means it is beneficial, whereas red means it is detrimental. If no arrow exists, then there was no change in value.

Table 1-1: SIDRA Modelling outputs for motor vehicles in the through/left lane

Scenario	Approach	Capacity (veh/h)	Degree of Saturation (veh/cap)	Average Delay (sec)	Level of Service	95% Queue Length (m)
Existing rule (no priority/protection)	South Rd	762	0.621	13.7	LOS B	69.8
	East Rd	563	0.878	28.6	LOS C	120.9
	North Rd	743	0.878	25.6	LOS C	146.4
	West Rd	660	0.439	15.2	LOS B	39.8
Cyclist priority, no protection	South Rd	783 ↑	0.605 ↓	13.5 ↓	LOS B	73.2 ↑
	East Rd	618 ↓	0.911 ↑	35.7 ↑	LOS D ↓	143.3 ↑
	North Rd	735 ↓	0.888 ↑	28.0 ↑	LOS C	160.9 ↑
	West Rd	635 ↓	0.456 ↑	17.1 ↑	LOS B	44.5 ↑
Cyclist protection from turns	South Rd	738 ↓	0.642 ↑	19.0 ↑	LOS B	98.0 ↑
	East Rd	583	0.966 ↑	57.7 ↑	LOS E ↓	207.6 ↑
	North Rd	680 ↓	0.959 ↑	52.1 ↑	LOS D ↓	246.5 ↑
	West Rd	631 ↓	0.459 ↑	21.3 ↑	LOS C ↓	56.0 ↑
Advanced green cyclist phase	South Rd	657	0.721 ↑	16.5 ↑	LOS B	76.6 ↑
	East Rd	603	0.934 ↑	25.5 ↓	LOS C	111.9 ↓
	North Rd	647	1.008 ↑	48.1 ↑	LOS D ↓	204.1 ↑
	West Rd	620	0.467 ↑	16.7 ↑	LOS B	41.1 ↑
Separate green cyclist phase	South Rd	627 ↓	0.756 ↑	21.0 ↑	LOS C ↓	94.4 ↑
	East Rd	516 ↓	1.091 ↑	118.9 ↑	LOS F ↓	283.2 ↑
	North Rd	605 ↓	1.079 ↑	107.3 ↑	LOS F ↓	333.0 ↑
	West Rd	540 ↓	0.536 ↑	21.9 ↑	LOS C ↓	52.0 ↑

As can be seen from, Table in each scenario the delay to traffic generally increases on each leg of the intersection. The best performing scenario was when the cyclist had priority, but no protection. This caused an approximate increase of one to two vehicles to some of the 95% queue lengths, while adding

a few seconds to the average delays of each leg. This scenario was closely followed by the advanced green cyclist phase, which only adversely affected the southbound through traffic (heaviest flow) by effectively removing some green time from that leg. Other legs had marginal negative impacts.

The worst performing scenario was the separate cyclist green phase, which provided a 10 second phase for cyclists, with a four second effective green time. This took the most time away from the other phases. The advanced green scenario is effective as it doesn't require any amber or red time to be 'lost' in the signal cycle.

Table 1-2 details the outputs for the northbound and southbound cycle facilities.

Table 1-2: SIDRA Modelling outputs for people cycling

Scenario	Approach	Capacity (veh/h)	Degree of Saturation (veh/cap)	Average Delay (sec)	Level of Service	Queue Length (m)
Existing rule (no priority/protection)	North Rd	428	0.098	22.0	LOS C	2.4
	South Rd	402	0.118	22.3	LOS C	2.7
Cyclist priority, no protection	North Rd	2701 ↑	0.016 ↓	9.7 ↓	LOS A ↑	1.6 ↓
	South Rd	2657 ↑	0.018 ↓	9.9 ↓	LOS A ↑	1.8 ↓
Cyclist protection from turns	North Rd	509 ↑	0.083 ↓	32.9 ↑	LOS C	3.6 ↑
	South Rd	501 ↑	0.095 ↓	33.1 ↑	LOS C	4.0 ↑
Advanced green cyclist phase	North Rd	2615 ↑	0.016 ↓	9.6 ↓	LOS A ↑	1.5 ↓
	South Rd	2572 ↑	0.018 ↓	9.8 ↓	LOS A ↑	1.7 ↓
Separate green cyclist phase	North Rd	396 ↓	0.106 ↑	30.8 ↑	LOS C	3.2 ↑
	South Rd	390 ↓	0.122 ↑	31.0 ↑	LOS C	3.6 ↑

The two best performing scenarios of 'cyclist priority, no protection' and 'advanced green cyclist phase' are very closely matched in terms of metrics. Queue lengths are not of a concern for cyclists, the key factor is the change in delay. Both of these scenarios show a significant reduction in delay of approximately 12 seconds. The 'cyclist protection from turns' phasing introduces a separate phase for right-turn vehicles from the north and south approaches, therefore it creates more delay for all legs.

Once again, it should be remembered that the above efficiency comparison is a worst case scenario should an existing separated cycleway be considered with or without the Rule change. In many cases, a more valid comparison may be between an on-road cycle lane provided under the current Rules and a separated cycleway provided under the proposed Rules. Given that turning traffic will be required to give way in both cases, this is likely to lead to negligible changes in overall efficiency.

1.7 Effects on Road User Safety

The potential safety effects of this proposal are:

- Conflicts between turning traffic on the main road and through-cyclist(s) crossing their path.

- Conflicts between through traffic on the main road and turning traffic in front of them who slow down or stop suddenly for a cyclist(s)
- Conflicts between traffic on the side-road and main-road cyclist(s) crossing in front of them.
- Reduced likelihood or severity of conflicts between through-cyclists and turning traffic *if* the traffic slows down more before turning.

It is expected that a change in the Road User Rule to allow this behaviour would have a slight effect on the safety of road users. This is due to the different approach speeds of cyclists compared with pedestrians, and turning motorists not thinking to look for approaching cyclists or choosing to filter turn unsafely through cycle crossing movements. The effects may be different depending on the form of intersection control, as there is some ability to control various conflicting movements with signal phasing.

The most likely crash scenario is that turning drivers do not see approaching cyclists. As separation width increases, drivers are less likely to think about and look for cyclists and there may be more physical constraints on actually being able to see them (e.g. parked cars, street furniture, or simply the limitations of the driver's cone of vision). If cyclists are travelling in the opposing direction (relative to the adjacent traffic lane) on a two-way cycle facility, then drivers are even less likely to look for them (although strong signs/markings may help to remind them).

Some cyclists currently choose to cycle across pedestrian crossings at signalised intersections, which is a similar movement to cyclists coming from a separated cycleway.

Interrogation of cycle crash data from CAS (2011-15) for injury crashes where the cyclist was identified as *"riding in a pedestrian space"* (factor code 204) found 29 such crashes occurred at signalised intersections, 15 occurred at roundabouts, and 95 occurred at priority-controlled T, Y or X intersections. 33 crashes also had the factor *"failed to give way entering roadway not from driveway or intersection"* (factor code 312), most of them included in the above numbers. However, it is difficult to tell from the summary data which of these crashes would be affected by the proposed rule change. Only by analysing each individual crash reporting sheet can it be ascertained whether the cyclist was undertaking a movement that would have been legal for a pedestrian (i.e. the driver would have been obliged to give way to a pedestrian) or whether the cycle movement would have been illegal regardless of a rule change. It is also not certain how consistent NZTA staff are in using these factor codes for relevant crashes.

As far as can be ascertained, **no** fatal cycle crashes in New Zealand since 2006 have involved a collision between a turning motorist and a cyclist crossing an intersection from an off-road/separated facility.

A change in the existing priority rule, coupled with public education, is likely to lead to an improvement in turning motorists giving way to through-cyclists. This might also improve cycling safety for on-roadway situations (where through-cyclists already have precedence); e.g. during 2011-15 there were 78 "left-turn sideswipe" crashes (movement code GB) where the motorists were noted as *"did not check / notice another party behind"* (factor code 371). However, if this is coupled with increased confidence by cyclists to travel through without checking or slowing, and RCAs provide more facilities that encourage through-cycling priority without suitable design safeguards, then the net change in overall safety may be negligible. This is particularly pertinent in high-speed areas where the consequences of misjudgements are typically more severe.

No noticeable effect on pedestrian safety has been identified, as the newly prioritised cycle movements shouldn't conflict with any legal pedestrian movements. It is even possible that pedestrian safety when crossing side roads may also improve, as a result of drivers getting better at checking for anyone crossing before they turn.

1.8 Implementation Issues

There are two main ways to introduce this Rule; either:

- General permission to do so (unless signs prohibit it at certain locations)
- Permission to do so only when signs/markings allow it at certain location

Using the latter approach, the proposed Rule could initially be introduced at limited trial sites by introducing and legislating a sign/markings to designate where it was appropriate and then monitoring performance and behaviour there. Given that currently there are relatively few cycleway-vs-side-road

crossings in New Zealand, the relative impacts of either option may result in little difference between them.

For continuity of pathways and consistency of message, it is recommended that some form of cycleway markings extend across the side road (either dashed or solid lines, possibly with coloured surfacing). In the UK and other parts of Europe, so-called “elephant’s footprints” (squares of marking along each side of the crossing) are a common tool for cycleway crossings and could be introduced here (see Figure 1-8). Alternatively, side-road priority crossings in the UK (as discussed in Section 1.4) are denoted by dashed parallel lines. If the new Rule was not introduced universally, the presence of the markings could be the element that legally defines the cycleway precedence.



Figure 1-8: Example of “elephant’s footprints” crossing markings, Hannover, Germany

Where necessary, additional warning signage could help to remind crossing users of the presence of cyclists, e.g. consider the signage used in Australia to warn of crossing cycleways (Figure 1-9). However, the use of warning signs without regulatory signs as well (e.g. GIVE WAY) might possibly create confusion about the legal requirement to give way.

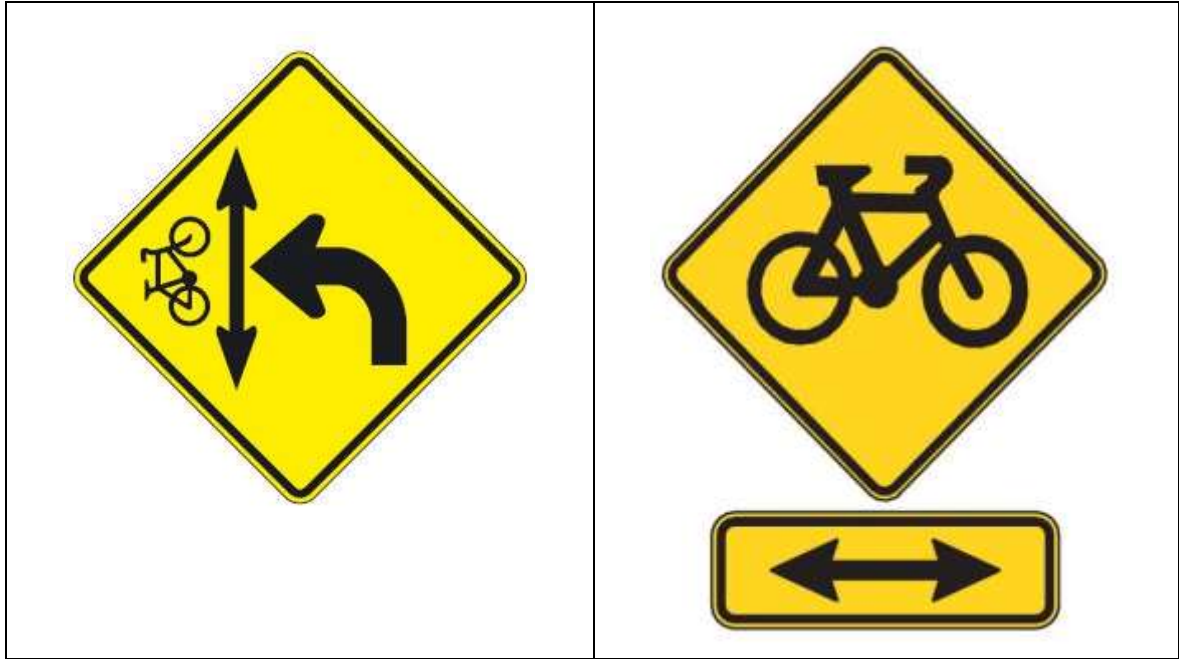


Figure 1-9: Examples of cycleway crossing warning signs, Australia

Another option to consider at signalised intersections is the introduction of a flashing amber arrow signal, which indicates that turning motorists are allowed to proceed, but must still give way to any pedestrians or cyclists continuing straight on. New York City has recently introduced these for left turns on a number of one-way streets with adjacent cycleways⁹. Other US cities have also used flashing ambers for opposed turn movements (see Figure 1-10) and Australian Road Rule 64 also allows them for left-turners who can proceed but must give way to pedestrians.



Figure 1-10: Example of a flashing amber turn signal, San Angelo, Texas

Consideration also needs to be given to the waiting vehicle, because if the cycle facility is too close to the main road, then there may be inadequate space for vehicles to queue without impeding the through-road traffic behind it. This may be particularly a problem for cross-road traffic crossing over a main road

⁹ New York City DOT (2016). *Don't Cut Corners: Left Turn Pedestrian & Bicyclist Crash Study*, Aug 2016.

under Rule 1P, who have nowhere to wait once they have elected to cross the main roadway. Therefore, the setback location of the cycle facility with regard to the through-lane traffic of the main road must be considered. Where facilities are already constructed, a case-by-case safety assessment will need to be undertaken to determine whether enough room exists for at least one average-sized vehicle to safely queue. If this is not possible, then perhaps GIVE WAY signage is necessary for the cycle facility.

Following the introduction of such a Rule, it is likely that the behaviour of people cycling/driving would change slightly, with an ever-increasing level of compliance as time progresses. There will undoubtedly be occasions where cyclist and motor vehicle will collide, due to confusion or forgetfulness of the rule change; the key will be designing intersections to minimise the relative severity of any such collisions. It is hoped that, whilst cyclists are afforded precedence over turning vehicles, they remain alert to the possibility of vehicles failing to yield to them. Therefore, public education should also encourage cyclists to not speed quickly through side road crossings when in the vicinity of other traffic. Since cyclists travel at much faster speeds than pedestrians, a motorist may not see a rider till the last moment when it is already too late. In time, the habit of looking for a cyclist becomes the norm when a driver is making a turning movement onto a side road, and most crashes can therefore be avoided.

The introduction of a Rule like this is likely to influence the choice of cycling infrastructure provided by RCAs. For example, at present RCAs may elect to provide conventional painted on-road cycle lanes to provide the necessary priority over turning traffic. If the Rule is changed, then more RCAs may be encouraged to develop separated cycleway options instead. This may in turn encourage more cycling.

Introduction of this Rule would need to ensure that a significant education and advertising campaign was undertaken to advise the population of the rule change. Failure to get the message through to the public could have serious consequences for a cyclist, if they were struck off their bicycle by an unsuspecting motorist.

It is likely that many motorists would not initially be familiar with (or forget) the requirement to give way to crossing cyclists. Therefore, at the busiest intersections, some form of warning signage may be useful to help remind drivers of their obligations (e.g. Figure 1-11).

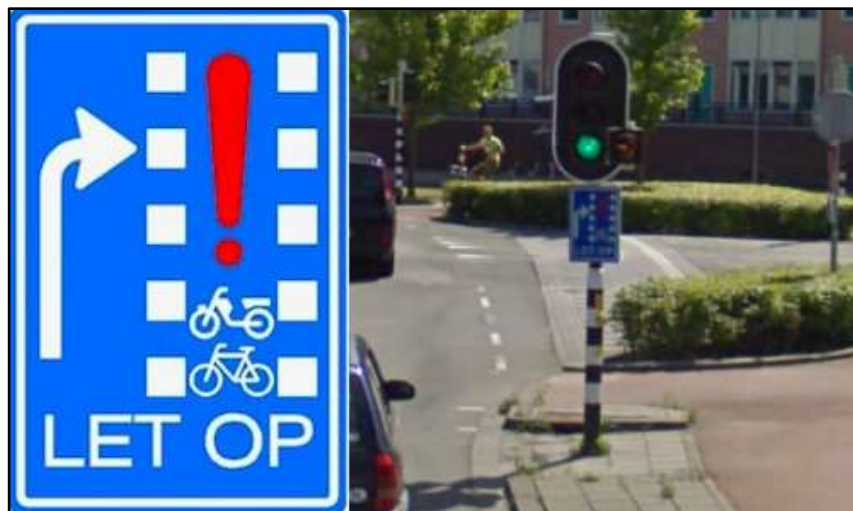


Figure 1-11: Dutch side-path warning sign for turning traffic (“let op” = “look out”) - c/ Pedestrianise London

A particular concern would be with two-way cycleways; overseas studies have found them to have higher risks (typically about three times worse in the opposite direction) due to the lower likelihood of motorists to check for cycles in the “wrong” direction¹⁰. Signage and cycleway design can help to lower the risk (e.g. reduce turning traffic speeds) but it remains a pertinent issue that increasing the priority for contra-flow cyclists over turning traffic may increase their riding speeds. It may be prudent to exclude two-way cycle facilities from general priority provisions at intersections, or at least introduce design

¹⁰ Rauh, W. (1990). “Russian roulette” on sidepaths – sidepaths are the target of criticism, proceedings of the Velo Secur 90 conference, Issues of Bicycling Safety, Lund University, Sweden.

features to alert riders and slow them down while crossing (e.g. advanced rumble strips or flashing lights).

The introduction of cyclist precedence at signalised intersections (Rule 1S) would provide a consistency with current pedestrian priority provisions. However, introducing a similar rule for cycling at unsignalised intersections (Rule 1P) without any corresponding change for pedestrians (which is being considered in Rule 2 of this report) may seem incongruous to many walking advocates. This would particularly be the case where a shared pathway is present and only cyclists are given priority over side roads.

While cycleway precedence across roundabout legs may not be advisable in many cases (e.g. busy multi-lane roundabouts), these particular cases shouldn't necessarily exclude all roundabouts from general consideration. As is seen quite often in the Netherlands, well-designed single-lane roundabouts may work perfectly well with cycleway priority. Depending on the form of Rule 1P adopted (i.e. sign for inclusion, or sign for exclusion), suitable or unsuitable roundabout sites could have GIVE WAY controls placed on the relevant legs to implement the desired effect.

1.9 Overall Conclusion

Overall the proposed Rule change has

- possibly negative effects on people driving, when crossing existing separated cycleways; little effect when replacing existing cycle lanes
- generally positive effects on people cycling
- generally neutral effects on people walking

For crossings at signalised intersections (Rule 1S), it is recommended that this Rule be implemented, universally across New Zealand via a change to the Road User Rule (unless signs or signal phasing prohibit it at certain locations).

For crossings at priority-controlled intersections and roundabouts (Rule 1P), the choice is less obvious whether the Rule is implemented universally or initially at limited trial sites in New Zealand via the introduction and legislation of the appropriate signs/markings to allow this. This is particularly so for shared paths where pedestrians are also crossing; then the recommendations as per Rule 2 (pedestrian precedence at intersections) should apply to both active modes. Cycle-only separated facilities are still relatively few in number in NZ (although many are currently being planned), so allowing universal implementation for these may not have a big immediate effect.

In the case of an "opt in" approach, the use of line markings to denote priority crossings is recommended (as per the UK regulations). That would also allow the clear identification of crossings where cyclists still have to yield priority.

Either way the behaviours and performance of road users at trial sites should be monitored in detail for consideration of wider uptake. To minimise potential risks, trials should only initially be allowed in lower-speed areas (i.e. no more than 60km/h speed limit), although turning speeds tend to be sufficiently low at most sites anyway.

For either option, a key change needs to occur around the definition of "roadway", as discussed in Section 1.3. The term "roadway" needs to include all cycle paths and cycle lanes (but not shared paths), regardless of the form of separation. This then allows many existing parts of the Road User Rule (particularly in regard to giving way) to apply equally to cycleways, unless specifically stated otherwise. Note that this revised definition alone would not be enough to give a cycleway precedence in all cases (e.g. at a mid-block crossing of a road); it would still be up to road controlling authorities to assign priority and design cycleway-road interfaces appropriately for the particular situation.

2 Rule change 2: Giving pedestrians precedence over traffic when crossing side roads

2.1 Overview of proposed Rule change

Under this Rule change, pedestrians walking alongside a road corridor who wish to cross a side road, would have precedence over traffic entering or leaving that side road, in the same manner that traffic on the main roadway does. Currently such precedence is only provided at signalised intersections or pedestrian (zebra) crossings. The pedestrian priority would probably only apply when the pedestrian crosses from one footpath adjacent to the main road, to the continuation of that footpath on the opposite side of the side road (alternatively, within the line of the road corridor); this avoids the potential to also give precedence much further away from an intersection.

This proposed Rule change does not intend for pedestrians to have precedence over vehicular traffic when crossing the main / priority road at an intersection. Nor does it intend to permit pedestrians to have precedence when crossing at a mid-block location when no form of control exists i.e. signalised mid-block crossing or pedestrian crossing marked on the road.

Under the current rules, the pedestrians in Figure 2-1 have to give way to any of the three approaching vehicles, as there is no zebra crossing or pedestrian signals at the crossing point.

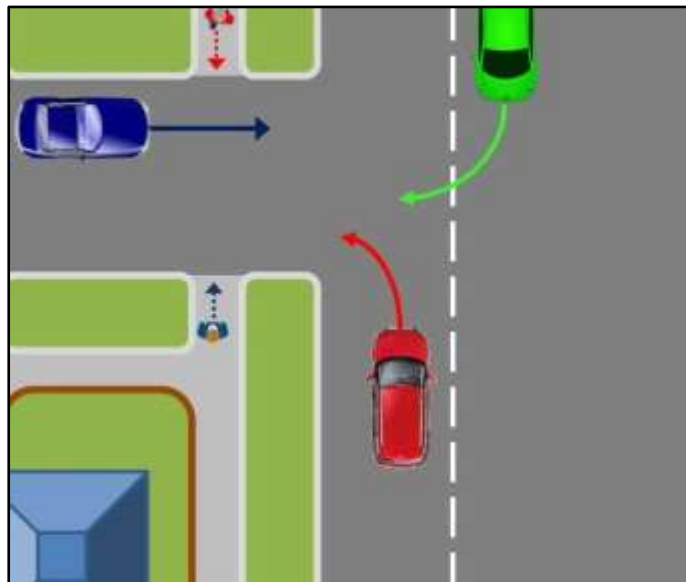


Figure 2-1: Current Road User Rule priorities

Under the proposed change, any vehicles turning across the path of the pedestrian from the adjacent main road would have to give way to the pedestrian as shown in Figure 2-2. This applies to a pedestrian crossing from either side of the side road.

Furthermore, traffic on the side road would also be required to give way to either pedestrian, as shown by Figure 2-2. This Rule would apply whether the side road traffic was intending to turn left or right onto the main road, or whether they were intending to continue straight through at a crossroad intersection.

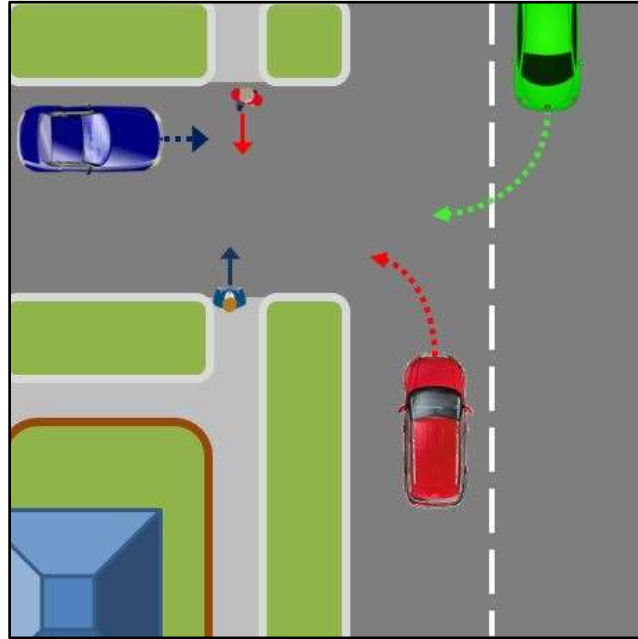


Figure 2-2: Proposed Road User Rule precedence for turning and side road traffic

2.2 Likely benefits of the Rule change

The expected benefits from introducing this Rule would include:

- Putting the onus on the vehicle driver to expect that the pedestrian will cross the side road and to approach the intersection with caution and alertness
- Certainty for pedestrians that they have precedence over vehicular traffic in this scenario
- A Level of Service improvement for pedestrians via travel time delay reductions
- Increased safety and protection for pedestrians when crossing the side road (once the Rule change has been bedded in for a period of time)
- Assistance for those pedestrians who are visually impaired or have a disability that makes crossing a road difficult, particularly to find a sufficient gap in the traffic flows to safely cross
- Simplifying some of the decision-making process for young pedestrians and other cognitively-impaired pedestrians about when it is safe to cross a side road
- Consistency for overseas visitors used to more pedestrian-friendly crossing laws elsewhere

These (and any identified concerns) are discussed in more detail below.

2.3 Existing NZ Legislation

Part 3 of the Land Transport (Road User) Rule controls operations at **signalised intersections**. Section 3.2 states (**emphasis** added):

(1) *While a green signal in the form of a disc is displayed,—*

(a) *a driver facing the signal may proceed straight ahead or may turn left or right at an intersection unless a red signal in the form of an arrow or a special sign prohibits that movement:*

(b) *a driver facing the signal, including a driver turning left or right, must—*

(i) *proceed with due regard to the safety of other road users; and*

(ii) *give way to **pedestrians, riders of mobility devices, and riders of wheeled recreational devices lawfully crossing or about to cross the roadway**; and*

(iii) *give way to motor vehicles and cycles lawfully proceeding straight ahead:*

(c) *a driver facing the signal and turning right must give way to vehicles approaching from the opposite direction and lawfully turning or about to turn left.*

This would suggest that, at signalised intersections, through-pedestrians already enjoy a legal priority over turning traffic, at least when “lawfully crossing”. This is further clarified by the next clause:

*(2) While a green signal in the form of a disc is the only signal displayed, pedestrians, riders of mobility devices, and riders of wheeled recreational devices facing the signal may enter the roadway **unless a special signal for pedestrians indicates a flashing or steady red standing human figure symbol.***

Therefore, the priority only exists when either the pedestrian figure signal is either green, not displayed, or does not exist. However, once a pedestrian has lawfully entered the crossing, the signal may change (e.g. to flashing red) and there is still an obligation on a motorist not to hit the pedestrian. From a driver’s perspective, in practice it may be difficult for them to know whether the pedestrian entered the crossing lawfully or not, if the driver only observes the pedestrian signals at the time they are turning.

No similar precedence currently exists for pedestrians facing traffic turning or crossing at **unsignalised intersections**. The only other provision available is a “pedestrian crossing” (aka “zebra crossing”), which is also governed by the Land Transport (Road User) Rule 10.1 (**emphasis** added):

(1) A driver approaching a pedestrian crossing must—

(a) give way to pedestrians, and to riders of wheeled recreational devices or mobility devices,—

*(i) **on the pedestrian crossing**; or*

*(ii) **obviously waiting to cross it and who are not behind a school patrol sign**; and*

(b) if necessary, slow down and stop the driver's vehicle for that purpose.

(a similar clause, 3.9, applies to giving way at an operating school crossing)

It is pertinent to note that the legislation both at signalised crossings and zebra crossings includes giving way to pedestrians *about to cross*, who may have not yet left the footpath; a similar approach for other scenarios would provide consistency.

No specific legislation applies to the situation of pedestrians crossing at a roundabout; arguably this is complicated by the fact that all approach legs can act as a “main road” for approaching and departing traffic. If a roundabout is considered to be a series of priority T-intersections (i.e. between each approach road and the circulating lanes) then it is clear that a roundabout features the same lack of precedence for pedestrians as other priority-controlled intersections.

As discussed in Section 1.3, the recent *Land Transport Rule: Omnibus Amendment 2016* proposed to expand the definition of “intersection” to include “a place where a cycle path or a shared path crosses a roadway” (NB: but not “footpath”). While a pedestrian may be a legitimate user of a shared path, the relevant intersection give-way rules in Part 4 of the Road User Rule only refer to “drivers” (i.e. motorists and cyclists). Therefore, no precedence for pedestrians is currently provided for, or being proposed, away from signalised and zebra crossings.

2.4 Other Relevant Literature/Legislation

Koorey & McCrostie (2015)¹¹ investigated the feasibility of changing NZ’s pedestrian crossing legislation to allow for priority over turning traffic at unsignalised side-roads (not including roundabouts). Analysis of NZ’s pedestrian crash data found that, if NZ road rules did change, then crash patterns at unsignalised intersections *may* change to mirror those at signalised ones. A survey of road users’ understanding / perception of current and potential road rules found that, on average, 78% of people are already willing to give way to pedestrians, although the importance of an education campaign with any future changes was also noted. VISSIM simulation modelling of predicted delays to pedestrians and motorists found generally no notable effect on total personal delay caused by possible rule changes. Overall, implementing a rule change in NZ appears to be possible, and the implications of this are discussed further.

¹¹ Koorey G., McCrostie C. (2015), “Feasibility of Implementing International Pedestrian Crosswalk Laws in New Zealand”, *IPENZ Transportation Group Conference*, Christchurch, 22-24 Mar 2015, 16pp.

Koorey & McCrostie (2015) noted that generally jurisdictions in Europe and North America provide greater pedestrian priority at intersections than currently found in NZ. For example, the California Vehicle Code (Division 11, Chapter 5)¹² states that:

21950. (a) *The driver of a vehicle shall yield the right-of-way to a pedestrian crossing the roadway **within any marked crosswalk or within any unmarked crosswalk** at an intersection, except as otherwise provided in this chapter.*

(b) *This section does not relieve a pedestrian from the duty of using due care for his or her safety. **No pedestrian may suddenly leave a curb** or other place of safety and walk or run into the path of a vehicle that is so close as to constitute an immediate hazard. No pedestrian may unnecessarily stop or delay traffic while in a marked or unmarked crosswalk.*

Note that the law also places some onus on pedestrians to behave predictably too (a similar requirement to “*not suddenly enter a pedestrian crossing*” can be found in Rule 11.5 of NZ’s Road User Rule). The basis of most US law is a legal “crosswalk”, which is typically defined as the extension of footpaths across an intersection (e.g. a four-leg urban intersection would usually have crosswalks on all four sides; regardless of whether one road had priority over another). However, the ambiguity of its definition and the variability in the marking of such crosswalks (from no markings at all to more recognisable treatments; despite there being no legal difference between them) leads to its inconsistent use between states/provinces. Despite this, in practice the laws still provide good priority for pedestrians.

It is interesting to note too that many US states also provide a specific right-of-way for vision impaired pedestrians, such as this clause from California:

21963. *A totally or partially blind pedestrian who is **carrying a predominantly white cane** (with or without a red tip), **or using a guide dog**, shall have the right-of-way, and the driver of any vehicle approaching this pedestrian, who fails to yield the right-of-way, or to take all reasonably necessary precautions to avoid injury to this blind pedestrian, is guilty of a misdemeanor...*

(NB: separate clauses detail who may legally fall under this clause)

In Australia, various sections of the road rules (Rules 67, 69, 72, 73) require drivers at unsignalised intersections (but not roundabouts) to give way to crossing pedestrians. For example:

67 Stopping and giving way at a stop sign or stop line at an intersection without traffic lights

*(4) If the driver is turning left or right or making a U–turn, the driver must also **give way to any pedestrian at or near the intersection who is crossing the road, or part of the road, the driver is entering.***

Of note is the fact that the Australian Rules (as clarified in Rule 353) don’t require a driver exiting from a side road to give way to pedestrians crossing the *side road* at the intersection (i.e. travelling along the main road corridor), which is different from many European or North American jurisdictions. Instead, the focus is on the road being *entered*; i.e. the Rules protect a pedestrian crossing in a gap on the main road who may have not noticed a vehicle turning out of a nearby side road.

In summary, virtually every comparable developed country that NZ compares itself to provides greater pedestrian crossing priority than found here. This puts NZ out of step with a large part of the world.

2.5 Existing Observed Practice in NZ

Currently, the behaviour of turning motor vehicle drivers’ who do permit pedestrian precedence on a side road, is not very common and is not consistently applied by those drivers who do. Often this is predetermined by how busy the surrounding traffic is and whether or not the courteous driver would delay other motor vehicles. When a motor vehicle driver is courteous, strong eye contact between driver and pedestrian is often necessary along with some hand gesturing and head nodding to confirm that the driver is permitting the pedestrian to cross in front of them.

No specific field observations were recorded for this proposed rule change. However, the authors of this report do anecdotally observe such behaviour occurring infrequently day to day. When this courtesy

¹² State of California (2016). Pedestrians’ Rights and Duties. *California Vehicle Code*, [leginfo.legislature.ca.gov/faces/codes_displayText.xhtml?lawCode=VEH&division=11.&chapter=5](http://leginfo.ca.gov/faces/codes_displayText.xhtml?lawCode=VEH&division=11.&chapter=5).

does occur, it would appear to be more common in low volume areas such as residential areas. In such instances, the fact that there is a lack of other motorists present or that the courteous driver is in no hurry to arrive at their destination, is likely to influence the decision to allow the pedestrian to cross in front of the vehicle.

Koorey & McCrostie (2015) undertook a perception survey of pedestrian priority in New Zealand. From 876 respondents, the survey found that a majority (78%) of people were supportive of giving way to pedestrians at intersections, with about half indicating support if some kind of crosswalk markings were present. There was reasonable similarity in support between the different scenarios presented, although slightly greater support for giving way to pedestrians when turning *into* a side-road as opposed to turning out. Perhaps not surprisingly, those who walked more often were more supportive of giving way to pedestrians than those who drove more often, but the difference in support was only about 12%.

2.6 Effects on Network Efficiency

The potential efficiency impacts of this proposal are:

- Delays to turning traffic on the main road who have to wait for a pedestrian(s) to cross their path.
- Delays to through traffic on the main road who are held up in the same lane as the turning traffic
- Delays to traffic on the side-road who have to wait for a main-road pedestrian(s) to cross.

It is expected that a change to the Road User Rule to allow this behaviour would have a varied range of effects to the efficiency of road users, all dependent on the lane layout of different intersections. The main effects to efficiency would occur when turning traffic from the main road delays following through-traffic if they share the same lane and there is not enough space for the through vehicle to get past safely. Where turning vehicles have their own dedicated turning lane, this is not expected to affect the efficiency of through-traffic in most instances. However, there will be locations around the country where the short length of a turning lane, coupled with a certain demand for turning traffic, may cause turning vehicles for the side road to form a queue which blocks part of or all of the through lane. In saying this, the effect would be no different to what vehicle drivers are used to when negotiating signalised intersections that include pedestrian crossing facilities.

For the very large majority of situations where vehicular traffic on the side road is approaching the intersection and must give way to pedestrians, there will be little variation to the outcome. Either the vehicle will experience a delay due to pedestrians being present or they will not be delayed due to no pedestrians present.

VISSIM modelling was undertaken by Koorey & McCrostie (2015) to consider the effects on traffic performance of introducing this Rule. They considered the outcome for a T-intersection and a crossroad, both unsignalised. The authors also modelled the outcome for three varying levels of flow rates (Max, Med and Min) for both pedestrians and vehicles. Table 2-1 and Table 2-2 show the respective change in delay for pedestrians and motor vehicles at a T-intersection (in total seconds gained or lost per hour).

Note: the colour coding indicates green for a positive outcome and red for a negative outcome, with a spectrum of colours between the two extremes.

Table 2-1: Change to pedestrian delays at a T-intersection (secs saved / hr) (Source: Koorey & McCrostie 2015)

		Vehicle		
		Max	Med	Min
Pedestrians	Max	1360	366	144
	Med	432	135	35
	Min	144	89	-6

Table 2-2: Change to vehicle delays at a T-intersection (secs gained / hr) (Koorey & McCrostie 2015)

		Vehicle		
		Max	Med	Min
Pedestrians	Max	-1599	-476	-133
	Med	-461	-150	-46
	Min	-110	-44	-18

There were only three scenarios where a net gain in delay savings across both transport modes were achieved. These were:

- Pedestrian Min vs. Vehicle Max (34 s/hr)
- Pedestrian Min vs. Vehicle Med (45 s/hr)
- Pedestrian Max vs. Vehicle Min (11 s/hr)

Table 2-3 & Table 2-4 show the respective change in delay for pedestrians and motor vehicles at a cross-road intersection.

Table 2-3: Change to pedestrian delays at a crossroad (secs saved / hr) (Koorey & McCrostie 2015)

		Vehicle		
		Max	Med	Min
Pedestrians	Max	2425	588	193
	Med	942	310	81
	Min	309	95	-8

Table 2-4: Change to vehicle delays at a crossroad (secs gained / hr) (Koorey & McCrostie 2015)

		Vehicle		
		Max	Med	Min
Pedestrians	Max	-4069	-1408	-280
	Med	-1104	-316	-99
	Min	-1109	-38	-33

There was only one scenario where a net gain in delay savings across both transport modes was achieved. This was:

- Pedestrian Min vs. Vehicle Med (57 s/hr)

The outcome of increased delays to vehicular traffic was expected, particularly in most of the medium and maximum traffic scenarios. Naturally as a fourth leg was introduced to the model to form a cross-road, the net delay savings reduced. Therefore, in large portion of circumstances on the New Zealand road network, there will be an increased delay for vehicular traffic. Note that most busy intersections will be already signalised, so this rule change would encapsulate those priority intersections in the next tier down of traffic volume.

2.7 Effects on Road User Safety

The potential safety effects of this proposal are:

- Conflicts between turning traffic on the main road and pedestrian(s) crossing their path
- Conflicts between through traffic on the main road and turning traffic in front of them who slow down or stop suddenly for a pedestrian(s)
- Conflicts between traffic on the side-road and main-road pedestrian(s) crossing in front of them. In particular when the side-road has two approach lanes (or space for two vehicles to fit side by

side) and one vehicle obstructs view of the crossing pedestrian for the adjacent approaching side road vehicle

- Reduced likelihood or severity of conflicts between pedestrians and turning traffic *if* the traffic slows down more before turning
- Conflicts at crossroads, between pedestrians, opposing side road traffic, and main road traffic. If crossing vehicles were required to give way to pedestrians, then they could end up queuing in the path of a main road through lane
- Greater assistance for those pedestrians who are visually impaired or have some physical disability that makes crossing a road difficult, particularly to find a sufficient gap in the traffic flows
- Simplified decision-making process for young pedestrians and other cognitively-impaired pedestrians about when it is safe to cross

It is expected that a change in the Road User Rule to allow this behaviour would have a moderate effect on the safety of road users, in particular to pedestrians. It is expected that for a period of time there will be crashes where pedestrians are hit by vehicles whose driver had either forgotten that the new rule was in place, or were unaware that the rule change had even occurred (which could still reasonably occur despite all efforts to raise public awareness ahead of the change). Assuming that many pedestrians will initially be reasonably cautious, the number of crashes of this nature are likely to be small (remembering that drivers still have an obligation not to hit deliberately pedestrians, regardless of who legally has precedence).

The expected crash scenarios/codes that would occur are;

- **Right turning vehicles hitting a pedestrian (CAS codes ND, NF)** - vehicles turning off the main road across a lane of opposing traffic, who hit a crossing pedestrian. This would be of particular concern when the right turn vehicle turns quickly to filter through a tight gap in the through-traffic. The speed of the turning vehicle coupled with the need to clear the opposing through lane, may mean the crossing pedestrians are in danger of receiving serious injuries.
- **Left turning vehicles hitting a pedestrian (CAS codes NC, NE)** - vehicles turning left and not checking whether the nearside pedestrian is about to step out and cross the road. Also not observing that a pedestrian was already crossing the road from the far side. Generally, the turning speeds will be relatively slow to make the left-turn manoeuvre, which will reduce crash severity.
- **Vehicles approaching on minor road hitting a pedestrian (CAS codes NA, NB)** - this is more likely to occur when there are two approach lanes to an intersection and the pedestrian is walking from the right of the driver to the left. If another vehicle ahead of the approaching vehicle has already stopped to allow the pedestrian to cross, the stopped vehicle may obscure view of the pedestrian for the approaching vehicle. The approaching vehicle may then fail to slow down or stop in time and are surprised to see a pedestrian walk out in front of them. This crash is similar to the threat posed at marked pedestrian crossings that cross two lanes of traffic in the same direction (which suggests that multiple-lane approaches for priority-controlled side roads should be discouraged where possible). However, given that minor road traffic would be expected to slow down or stop to yield to main road traffic anyway, these crashes should not be high severity.
- **Vehicles approaching from the opposing minor road (at crossroads) hitting a pedestrian (CAS codes NA, NB)** - whilst pedestrians will be cognisant of looking for turning vehicles, they may forget to be equally alert to through-vehicles crossing the main road from the opposing side road of a crossroad. In much the same manner as a right turning vehicle, the through vehicle might filter through a tight gap in the opposing main road through-traffic. The speed of the vehicle coupled with the need to clear the main road through lane, may mean the crossing pedestrians are in danger of receiving serious injuries.

It should be noted that many of these crash movements are already existing problems with priority-controlled intersections under the current Rules, particularly right-turning vehicles entering side roads.

As shown by the 2012 give way rule change in New Zealand, which occurred with little negative outcome to road safety, road users can successfully adopt a rule change. However, the consequence of a low speed intersection crash between two motor vehicles can be quite different to that of a low speed crash between a vehicle and a pedestrian. Therefore, the mistakes by motorists who forget to apply the new 2012 rule have not tended to be punished by a fatal or serious injury crash.

Another factor with the 2012 rule change is that, previously, New Zealand was the only country in the world at the time who legislated that near-side (left) turn vehicles give way to far-side (right) turn vehicles, so the new rule was in essence no change for overseas visitors. With most of those tourists also being familiar with pedestrian priority rules in their home places, the same understanding and behaviour is likely to be replicated for this rule change.

The Koorey & McCrostie research reviewed crash data in CAS between January 2009 and July 2014, which related to pedestrian crashes at signalised and unsignalised (non-roundabout) urban intersections. This produced 1,750 crashes that fitted the identified criteria. Of particular interest to the authors were the factors contributing to the crashes and the vehicle and pedestrian movements involved in the crashes. Given the different pedestrian rules currently applying to signalised vs unsignalised intersections, it was hoped that this might shed some clues as to how the crash pattern might change if the rules were changed. It should be noted however, that a new Rule change would not necessarily result in a situation where priority-controlled intersection crashes mimicked the patterns at signal-controlled intersections. With the latter, signal phasings and higher traffic volumes result in different likelihoods of pedestrian conflict with drivers.

The authors found various factors contributed to pedestrian crashes during the surveyed period, as shown in Figure 2-3. “Pedestrian factors” were by far the largest contributor to pedestrian crashes. These are discussed further below), making up 46% of the total crash factors for both signalised and unsignalised intersections. Poor observation from the driver was attributed to 19% of the total crash factors, and failure of the driver to give way or stop was only 12%. The latter cause was found to be considerably more prevalent at signalised intersections.

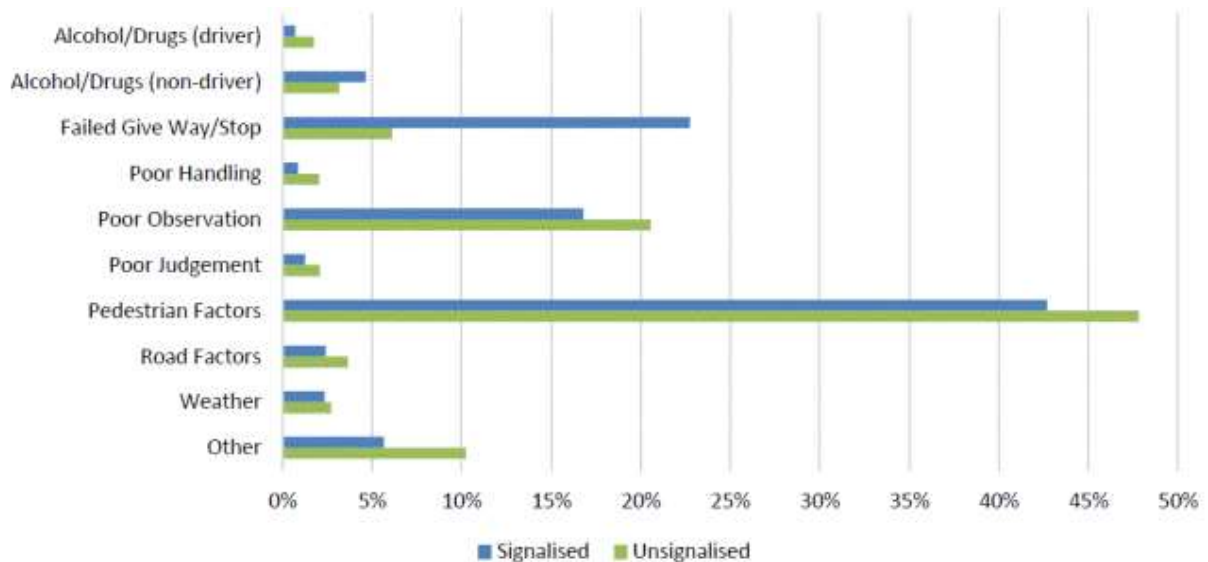


Figure 2-3: Factors contributing to pedestrian crashes at urban intersections (Koorey & McCrostie 2015)

Figure 2-4 provides the breakdown of the main individual “pedestrian factors”. Pedestrians “walking or running heedless of traffic” were the most common causes and accounted for approximately 23% of all crash cause factors; typically these are related to cognitive issues, e.g. young children or drunk adults. Walking heedless of traffic was more prevalent at unsignalised intersections, than at signalised intersections, which may simply reflect the current differences in legal pedestrian priority and hence attributed fault. However, there was only a minor difference for pedestrians running heedless of traffic at signalised and unsignalised intersections.

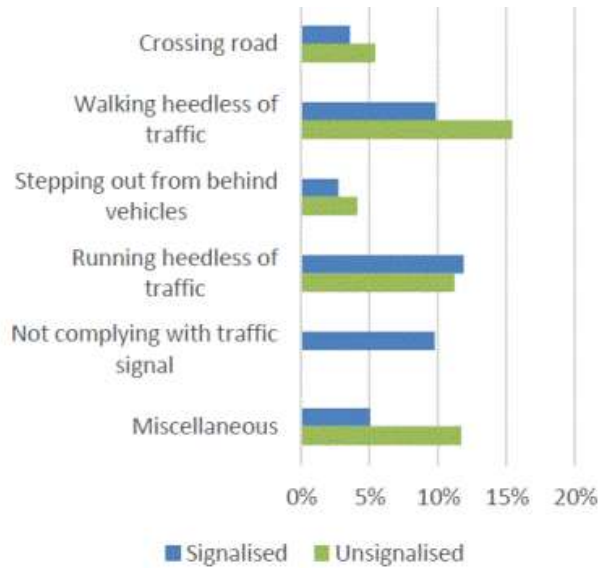


Figure 2-4: Pedestrian factors contributing to urban intersection crashes (Koorey & McCrostie 2015)

Figure 2-5 shows the distribution of vehicle and pedestrian movements involved in pedestrian crashes, while Figure 2-6 explains the CAS movement coding. Koorey & McCrostie (2015) surmised the following;

“The two most common movements involved in pedestrian crashes are the NA (left side crash) and NB (right side crash) movements. Some of these crashes will relate to vehicles turning out of a side road; however, these crashes cannot be separated from the rest of the NA and NB data. Nevertheless, it could be reasonable to presume that the proportions of these crashes may go down at unsignalised intersections if a rule change was introduced. The rest of the main turning movements (NC, ND, NE, NF) would largely equate (at unsignalised intersections) to traffic entering side-roads colliding with parallel pedestrians. If this became more similar to the signalised crash distributions with a rule change, their respective proportions would increase. What’s not entirely clear is what the absolute changes in crash numbers might be.”

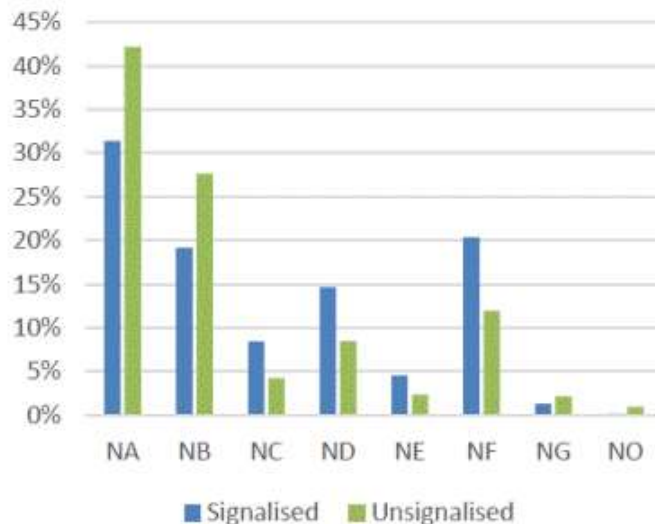


Figure 2-5: Movements involved in pedestrian crashes at urban intersections (Koorey & McCrostie 2015)

	A	B	C	D	E	F	G	O
N	 LEFT SIDE	 RIGHT SIDE	 LEFT TURN LEFT SIDE	 RIGHT TURN RIGHT SIDE	 LEFT TURN RIGHT SIDE	 RIGHT TURN LEFT SIDE	 MANOEUVRING VEHICLE	Other

Figure 2-6: AS movement codes for pedestrians crossing the road (Koorey & McCrostie 2015)

Koorey & McCrostie had hoped to compare the vehicle movement and causal factor data against similar pedestrian crash data from overseas. However, they were not able to find suitable data for comparison, as most other countries they investigated collect less detailed information for pedestrian crashes than CAS. Had a suitable comparison dataset been obtained, the authors had intended to determine if any noticeable differences in crash types existed between the data sets. It would have also indicated the possible effects of the suggested rule change in terms of absolute numbers.

The authors did not investigate the effect of any rule change on non-pedestrian motor vehicle crashes. In a fair assumption, they stated that it was possible that rear-end crashes could increase, as motorists stopping to wait for a crossing pedestrian could be hit from behind by another vehicle. Another crash type that could increase is crossing crashes (CAS code HA) at cross-road intersections, where traffic crossing the intersection on the opposing minor road are forced to wait for pedestrians to cross the side road and are hit in a side impact crash by a through traffic vehicle not expecting the crossing vehicle to stop and block part or all of their lane.

Ultimately, the likely safety effect of this Rule change (particularly in the short term) may depend on how well the pedestrian crossing environment is designed. For example, crosswalk signs and markings may help drivers to remember to check for pedestrians, while raised crossing designs may slow down vehicles sufficiently to reduce the likelihood or severity of any collisions. It may also be pertinent to only consider this rule initially in lower-speed (urban) areas.

2.8 Implementation Issues

There are potentially three main ways to introduce this Rule; either:

- General permission to do so at all signalised intersections, not including roundabouts (unless signs prohibit it at certain locations)
- Permission to do so only when certain signs/markings allow it at certain location
- Make use of the existing pedestrian (zebra) crossing marking device to indicate locations where pedestrians have precedence

No new signage or markings would be required to implement this Rule universally (i.e. by changing the Road User Rule), except for any locations where the default priority wasn't desired.

To alleviate concerns about the risks imposed by a universal law, such a law could initially be trialled only in very low speed areas (e.g. 30-40 km/h zones). For clarification to road users, this may require some additional signage at the zone entrances to indicate it is a "pedestrian crossing priority area" - some thought is still needed to determine the most suitable wording and graphics (perhaps a modified version of Figure 1-11 for pedestrians might be useful).

Alternatively, the proposed Rule could initially be introduced at limited trial sites by introducing and legislating a sign/markings to designate where it was appropriate. One option could be to use the "parallel lines" crosswalk markings from signalised intersections (see Figure 2-7); this would provide a certain consistency if also used at other places, although it could be argued that it is not a strong enough visual cue.



Figure 2-7: Parallel line crosswalk markings at a STOP-controlled intersection, Washington DC, USA

Another option could be a “ladder” style of marking (combining zebra stripes with parallel lines; see Figure 2-8), which is commonly found in North America, and was the most preferred option in a New Zealand survey by Koorey & McCrostie (2015).



Figure 2-8: Example of a “ladder” crosswalk, Boston MA, USA

Existing pedestrian (zebra) crossing markings could also be more widely used at intersections, which has the advantage of requiring no change in existing legislation (unless they were also used for shared pathway crossings). However, zebra crossings right up at the intersection (i.e. in line with the footpath route) are generally considered poor practice due to the lack of space for motorists approaching the crossing to clear the intersection. Common practice is to at least set them back somewhat from the intersection (see Figure 2-9), but the further they are set back, the less desirable a path they become for pedestrians. This issue is not unique to zebra markings alone though; any crosswalk marking would have the same issues of location vs queuing space.



Figure 2-9: An example of a zebra crossing, slightly set back from the intersection, New Plymouth

If a new form of crosswalk marking was introduced then, for consistency, it is probably important that similar giving way rules apply as for signalised and pedestrian crossings, i.e. drivers should have to give way to pedestrians who are already on the crosswalk or may be *about to cross*.

Following the introduction of such a Rule, the behaviour of people walking/driving would need to change greatly, to produce an environment where pedestrians are afforded increased safety and priority over turning vehicles. The rule would require a major behavioural change for vehicle drivers in particular, who are used to turning onto side roads unimpeded at all intersections. The behavioural change for pedestrians is not as significant; they need to continue to have an awareness of all vehicles nearby, but now also always carry the expectation that most turning vehicles will give way to them. As is currently the case, pedestrians still cannot expect to walk out suddenly onto the road and be safe; drivers do not always notice pedestrians before it is too late. Over time as drivers get used to the introduced rule, it will begin to become habitual and they will give way to pedestrians without much thought.

There would need to be a significant education and advertising campaign to alert all road users that the rule has changed, in a similar manner to the 2012 Give Way Rule changes. This rule in particular would need extensive coverage due to the possible death or serious injury to a pedestrian, if a driver fails to apply the new rule. It would be prudent to educate pedestrians that they should only cross the road when they are certain that the crossing vehicle is giving way to them; this would be crucial for younger pedestrians so they do not learn to expect that vehicles will always stop to allow them to cross first. Any campaign should also reiterate the existing driveway give way rules, as Koorey & McCrostie (2015) noted lower understanding of this existing rule.

Shared paths were previously discussed in the context of Rule 1; it would seem inconsistent, for example, to give pedestrians precedence over crossing traffic when travelling along a shared path but not give cyclists the same precedence. Therefore, shared path priority should also be considered as part of Rule 2. The option of using the existing zebra crossing markings for a shared path would currently rule out giving cyclists the same crossing rights (as zebra crossings only apply to pedestrians) unless the existing legislation was changed. An alternative option might be to create a hybrid crossing marking in these cases; for example, if “elephant’s footprints” are used for cycleways and zebra stripes for pedestrian ways, then a shared path crossing could use both combined.

In terms of best-practice guidance for road controlling authorities, a universal rule may require further investigation to determine whether there is a minimum traffic volume threshold that requires a priority

crossing markings to be installed. Guidance should also discuss options for designing side road crossings that reduce the relative risk for road users, e.g. through the use of raised crossing platforms and/or warning signs (see Figure 2-10).



Figure 2-10: Recently installed shared path crossing with raised platform, Quay St, Auckland - legally ambiguous but probably works adequately

2.9 Overall Conclusion

Overall the proposed Rule change has

- generally negative effects on people driving
- mostly neutral effects on people cycling
- mostly positive effects on people walking

It is recommended that this Rule be implemented initially at limited trial sites in New Zealand (possibly only 30-40 km/h zones) via the introduction and legislation of appropriate new markings to allow this. These new markings (possibly with the provision for optional supplementary signs as well) should also allow for cyclists to be able to cross shared path crossings with the same rights-of-way, or an additional cycle crossing marking should indicate this.

The behaviours and performance of road users at trial sites should be monitored in detail for consideration of wider uptake. Comparable studies of conflicts at zebra crossings and “courtesy crossings” would also be useful to inform the assessment.

A good model for implementing this Rule in New Zealand can be found in the current sections relating to pedestrian (zebra) crossings.

3 Rule change 3: Allowing cyclists to use a turning lane while riding straight ahead

3.1 Overview of proposed Rule change

Under this Rule change, people cycling would be able to use a traffic lane marked for turning left or right at an intersection to proceed straight ahead instead (see Figure 3-1). Such behaviour may be preferred to avoid riding in a narrow adjacent through-lane where other motor traffic may be travelling through at reasonable speed. Although initially envisaged to apply to left turns only, the rule ought to be flexible enough to allow proceeding straight from a right-turn lane as well. This would be especially useful at one-way streets, but can also provide benefits on two-way streets (for example, if the cyclist wants to turn right immediately beyond an intersection, or if it is safest to get to the next right turn opportunity by cycling adjacent to a solid median).



Figure 3-1: Cyclist using left-turn lane as through lane on green signal

Under the current rule, cyclists remaining in the “correct” lane may be squeezed by motor vehicles, either on the approach to or progressing through the intersection, or feel intimidated by the speed of through-traffic (Figure 3-2). Turn lanes provide a safer environment due to the generally lower speed differential:

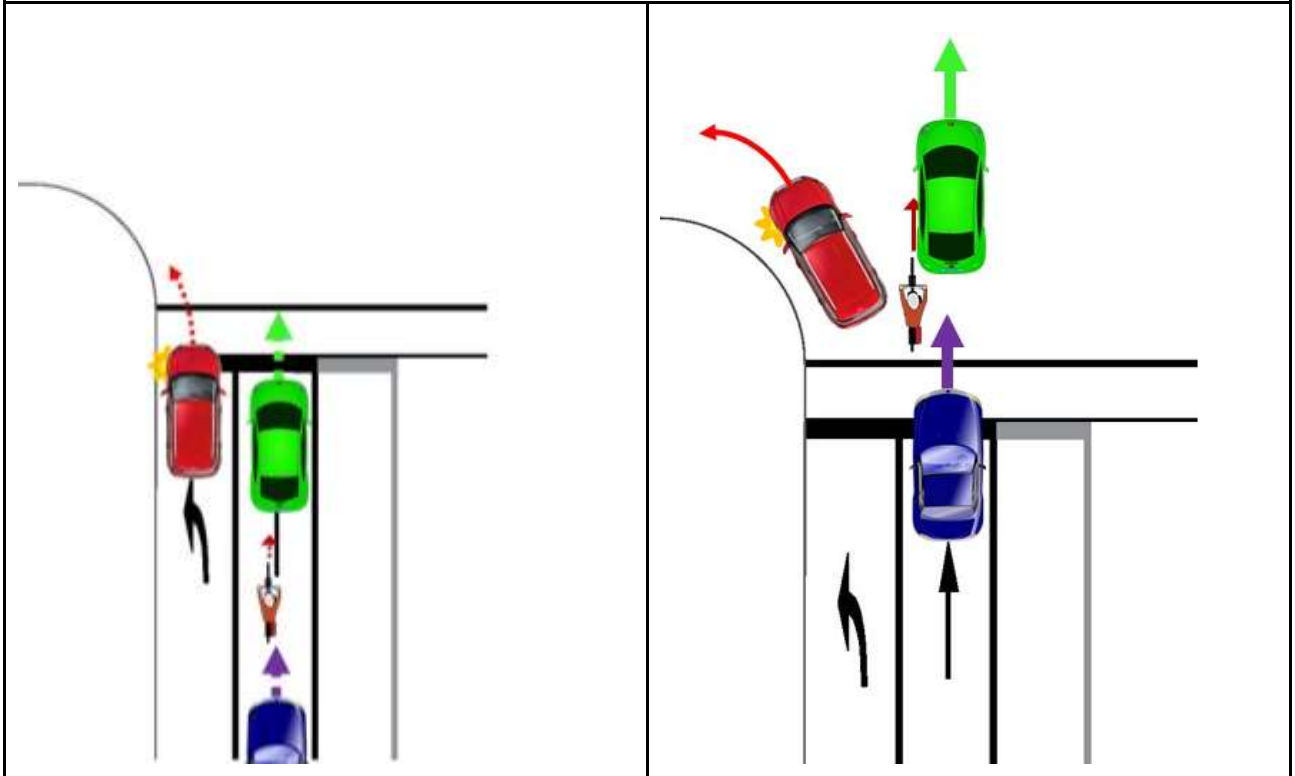


Figure 3-2: Cyclist remaining in through lane squeezed by motor vehicle

Under the proposed change (Figure 3-3), cyclists would have more room safely progressing through the intersection, adjacent to motor vehicles:

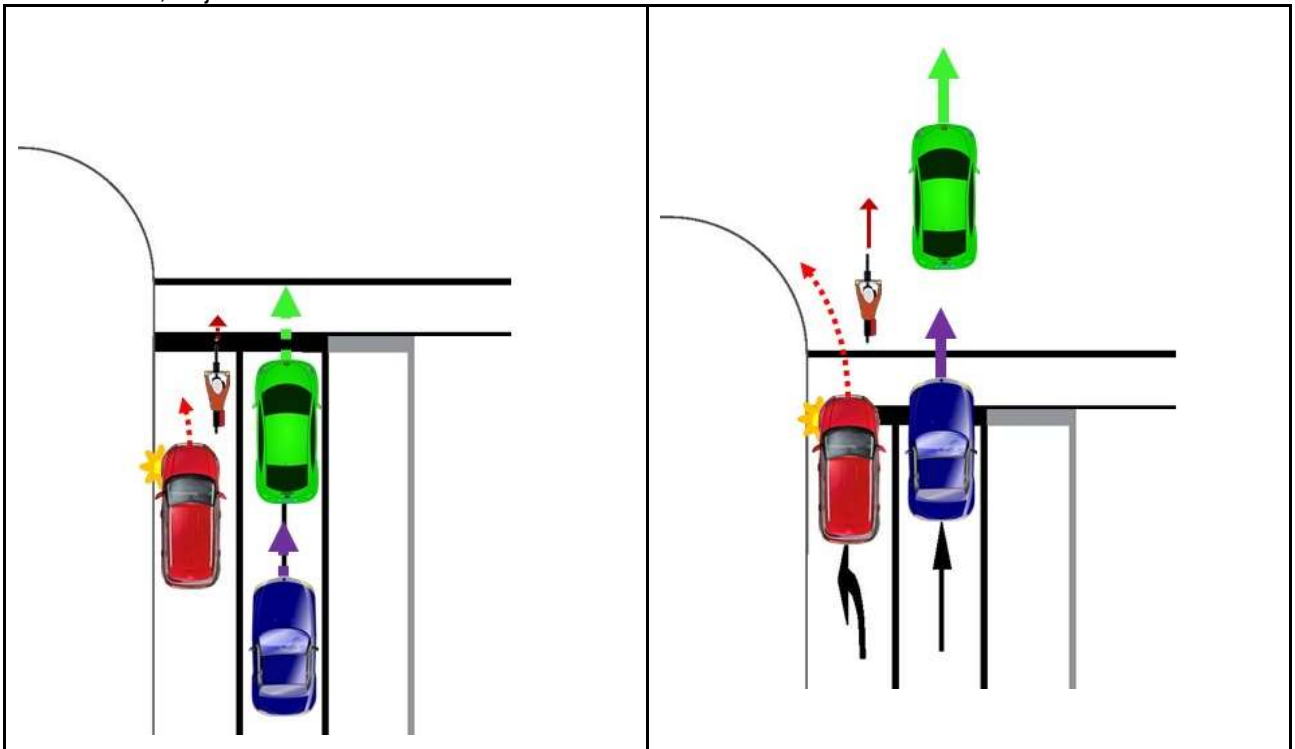


Figure 3-3: Cyclist travelling through from left turn lane

3.2 Likely benefits of the Rule change

The expected benefits from introducing this Rule would include:

- Legitimising an already common practice by many riders (typically done for their safety), which may reduce motorist antagonism
- Reduced conflicts between through-cyclists and adjacent through-traffic
- Minimising the need to fit in separate cycle lanes at every location, particularly in narrow roadway cross-sections (*whilst accepting that this does not excuse RCAs from making adequate efforts to provide distinct cycle facilities when feasible*)

These (and any identified concerns) are discussed in more detail below.

3.3 Existing NZ Legislation

Section 2.4 of the Land Transport (Road User) Rule states (**emphasis** added):

*If road markings or traffic signs designate specific lanes for specific manoeuvres at the approaches to an intersection, a driver must not use any lane except for **the manoeuvre appropriate to its marking or signage.***

Therefore, cyclists are not legally allowed to travel straight through an intersection from a lane marked with only a turn arrow.

Some Road Controlling Authorities (for example, Christchurch City) recognise that it is safer for cyclists to be beside the faster-moving through-traffic and therefore choose to leave left turn lanes unmarked, to avoid the consequences of this rule. However, this practice may result in confusion for motorists who may also attempt to travel straight from a lane that is generally designed to be a left turn lane. This is sometimes mitigated by signs that advise drivers of the expected behaviour (e.g. Figure 3-4), but providing signs for this purpose adds to the clutter of signs already present.



Figure 3-4: Left-turn lane exemption sign, Christchurch

The practice of avoiding a busy and fast through lane is also informally recognised in *The official New Zealand code for cyclists* (NZTA, November 2015, page 39), where it says about cycling straight through an intersection (**emphasis** added):

*If there is a lane that vehicles use for travelling straight through, look behind and when it's safe, signal intentions and move into the lane for traffic travelling straight ahead. If there is a continuous stream of fast flowing traffic that makes this unsafe, it will be **safest to ride just to the left of this lane.***

It is interesting to note too that in New Zealand it is already reasonably common to place an Advanced Stop Box intended for through-cyclists in front of a turning lane (see Figure 3-5). This appears to encourage the use of a turn lane for through-cyclists, despite the conflict with the above legislation.



Figure 3-5: Advanced stop box in front of left-turn lane, Christchurch

3.4 Other Relevant Literature/Legislation

In Switzerland and Germany¹³, separate cycle markings and arrows are used to indicate different allowed movements for cyclists than for other users of that lane (Figure 3-6; note that driving is on the right-hand side in these countries).

¹³ At least in Freiburg; not noticed elsewhere by the team.



Figure 3-6: Cycle markings allow cyclists to go straight from a right-turn lane, Winterthur, Switzerland

In Australia, the road rules allowing signage to enforce left-turn movements from the left-most lane (Rule 88) can have a “Bicycles Excepted” supplementary plate to exclude cyclists from this requirement (Figure 3-7); a similar sign is available to enforce right turns from the right-most lane.



Figure 3-7: Example of a signed left-turn lane where cyclists can go straight, Melbourne, Australia

3.5 Existing Observed Practice in NZ

Currently, proceeding straight ahead from an exclusive turn lane is already very prevalent among observed people cycling, with over 80% of riders observed using the turn lane.

Field observations of cyclists travelling north on Madras Street at Bealey Avenue during an evening peak period (i.e. with dense traffic) found that most cyclists (13 out of 14) travelling straight ahead did so from the left turn lane; the one cyclist who travelled straight ahead from a through lane appeared to be confused and had positioned himself between two through lanes while no motor traffic was present (see Appendix A).

Field observations of cyclists travelling east along Bealey Avenue at Madras Street during an evening peak period (i.e. with dense traffic) found that the majority of cyclists (5 out of 6) travelling straight ahead did so from the left turn lane and the other cyclist who travelled straight did so by lane splitting, i.e. no cyclists used a through lane (see Appendix A).

Field observations of cyclists travelling along Riccarton Road at Clarence Street / Straven Road during a morning peak period (i.e. with dense traffic) found that most cyclists (14 out of 16) travelling straight ahead did so from the left turn lane and the other two cyclists who travelled straight did so by lane splitting, i.e. no cyclists used a through lane (see Appendix C).

Field observations of cyclists travelling west along Brougham Street at Antigua Street / Strickland during a morning peak period (i.e. with dense traffic) found that, even though there is a cycle lane between the left turn and through lanes, 2 out of 6 cyclists travelling straight ahead did so from the left turn lane (see Appendix D). The cycle lane is appropriately placed to cater for cyclists travelling through. This observation shows that some cyclists will prefer to retain a kerbside position and cycle from the turn lane even where a cycle lane is present, possibly because they had trouble accessing the cycle lane in the first place (cycle lanes on Brougham St are discontinuous), or because they simply prefer to stay clear of fast-moving heavy traffic.

3.6 Effects on Network Efficiency

The potential efficiency impacts of this proposal are:

- Reduced delays to through-traffic not being slowed down by cyclists remaining in the through lane.
- Delays to a turning driver following a turning cyclist approaching in the turn lane, unsure whether the rider was going straight or not.
- Delays to turning traffic allowed to go but with a waiting through-cyclist blocking their path.
- Delays to a right-turning driver facing a left-turning cyclist approaching in the left-turn lane, unsure whether the rider was going straight or not (assuming that there is space for both vehicles to enter the side road side-by-side).

It is expected that a change in the Road User Rule to allow this behaviour would have a negligible effect on the efficiency of road users. This is due to the fact that existing behaviour would be legalised, i.e. no change in user behaviour influencing efficiency can be expected. For cases where a cyclist would have otherwise used the through lane but chooses instead to travel straight ahead from the left turn lane because of a rule change, the reduction in delay to through-traffic would outweigh the increase in delay to turning traffic, because the speed differential compared to cyclists is greater for through-traffic than turning traffic.

The reason for people on bikes displaying this illegal behaviour is probably because it is perceived by them that complying with the rules on busy roads would be significantly less safe.

No modelling was undertaken to consider the effects on traffic performance of introducing this Rule, as there is not expected to be any significant change in existing behaviour.

3.7 Effects on Road User Safety

The potential safety effects of this proposal are:

- Reduced conflicts between through-cyclists and adjacent through-traffic (especially high-speed traffic), due to greater separation.
- Conflicts between a turning driver and a through-cyclist in the same turn lane, with the driver believing that they were also going to turn into the same street.
- Conflicts between a waiting through-cyclist in the kerb-side lane and turning traffic.
- Conflicts between a right-turning driver and an opposing through-cyclist in the left-turn lane, with the driver believing that they were going to turn left into the same street.

It is expected that a change in the Road User Rule to allow this behaviour would have a negligible effect on the safety of road users. This is because the rule change would accommodate behaviour that is already commonplace due to people wanting to maximise their safety.

The most likely crash scenario relating to this rule would be that a cyclist using the left turn lane conflicts with following left turning vehicles; this would probably be coded “*vehicle hit rear end of cyclist stopped / moving slowly*” (movement code FA) and is especially likely at signalised intersections where a leading left turn is operated. There may also be some cases where drivers in the adjacent through-lane think that the cyclist will be turning left and do not give them enough space travelling through the intersection or on the departure.

The attempted crash analysis does not shed much light on the issue. Interrogation of cycle crash data from CAS (2010-15) found a maximum of 262 injury crashes possibly relating to this rule, based on the movement types AA, AC, AG, AO, FA, FD and GB involving cyclists near an intersection. Over 1000 crashes feature a “right-turn against” scenario (movement code LB), although most would be in situations that do not feature a separate left-turn lane. It is expected that (by far) the vast majority of crashes in these subsets were not due to cyclists travelling straight from a left turn lane (or intending to). For example, it is noted that only **one** crash of these types had the cyclist “*travelling straight ahead from a turning lane*” (factor code 173). Many crashes in these subsets involve cyclists to the left of motor traffic and being sideswiped by vehicles; these are more relevant to Rule 4 (overtaking to the left of traffic).

As far as can be ascertained, only **one** fatal cycle crash in New Zealand since 2006 can be attributed to cycling straight from a turn lane (Palmerston North, 2007). The rider was to the left of a truck that swung left at an intersection, driving over the cyclist. Although there have been a number of similar types of fatal crashes to this, they have typically involved a shared through/left lane or a separate cycle lane that a through-cyclist is legally allowed to use.

As the majority of cyclists currently use the left turn lane to cycle straight ahead, a rule change is unlikely to result in a significant increase in crashes related to this behaviour. Furthermore, any increase in these crashes, is expected to be outweighed by the reduction in conflicts that occur as a result of requiring cyclists to mix with the faster moving traffic in the through lane.

No noticeable effect on pedestrian safety has been identified, as the newly legalised cycle movements shouldn't conflict with any legal pedestrian movements.

3.8 Implementation Issues

There are three main ways to introduce this Rule; either:

- General permission to do so (unless signs prohibit it at certain locations)
- Permission to do so only when signs allow it at certain locations (like Australia)
- Permission to do so only when markings allow it at certain locations (like Switzerland)

The last two methods mentioned above (permission by exception only) mean that the proposed Rule could initially be introduced at limited trial sites by introducing and legislating a sign or marking to designate where it was appropriate. However, in practice there are already a large number of locations in New Zealand where this behaviour is probably appropriate and (more pertinently) where it is already largely happening. Therefore, a trial will probably not achieve any significant change in existing behaviour. If there are completely unsuitable locations for this behaviour (discussed further below) then it may be more cost-effective to sign them as exceptions to a general rule.

Following the introduction of such a Rule, it is likely that the behaviour of people cycling/driving would change very little, given that most people already cycle in this way. Thus there would be very little change in road user behaviour or crashes. A rule change would reduce the ambiguity of the situation and therefore improve safety for cyclists. Furthermore, making this rule change would eliminate the need to use unmarked lanes in place of left turn lanes (a practice common in some localities as a way of allowing cyclists to ride straight through from the kerbside lane) and therefore reduce the chance of motorists driving straight ahead from these lanes.

Some education would be required to inform road users (motorists as well as cyclists) that this behaviour is now permitted for cyclists. It might also be worth educating through-cyclists not to stay on the kerb side of a turn lane, to avoid misleading other road users about their intentions. In some cases, it might even be appropriate to mark a sharrow and possibly some coloured surfacing in the turn lane (either centred or on the inside edge) to indicate to drivers and cyclists alike what to expect.

Some busier intersections feature multiple left-turn lanes at an intersection (some may even be shared left and through lanes). Many less confident cyclists may instinctively look to approach in the kerb-side lane. There is great potential for conflict if through-cyclists were allowed to use the leftmost turn lane at the same time that traffic to their right was allowed to turn left. Therefore, it would be prudent to require that a left-turn exemption for cyclists only applied to sites with a single left-turn lane (or that cyclists could only use the lane immediately to the left of the through lanes). A similar argument could be made for multiple right-turn lanes.

Some intersections have separate turn phases while through-traffic is stopped (see Figure 3-8). This can present a problem if through-cyclists stop to wait in the turn lane, thus blocking the movement of those with a green arrow. Best practice at these locations would be to provide separate space for through-cyclists to wait (e.g. a separate cycle lane or advanced stop box in front of the through-lane); however, it may also be prudent to require that, where practicable, any riders using a turn lane to go straight ahead do not block the passage of any other vehicles legally allowed to turn. Where necessary, the addition of supplementary signage prohibiting through-cyclists from using the turn lane may also be warranted (for example, where a narrow turning lane has no lateral space for a waiting cyclist).



Figure 3-8: A left turn lane allowed to go while through traffic is held back, Christchurch

A rule addition requiring cyclists to not block turning traffic “if practicable” may be of benefit to reduce conflicts between cyclists and turning traffic. However, the project team has come to the conclusion that it would be better to keep the rule as simple as possible, and provide guidance to the same effect via road user education instead. In practice, cyclists will probably prefer to ‘get out of the way’ as much as is possible anyway. But there may well be cases where individuals feel that such action is not ‘practicable’ and they would probably be a better judge of such a situation than a law enforcement officer who may lack practical experience riding a bike in traffic.

The rule would also technically apply to left turns at unsignalled intersections, e.g. left-turn deceleration lanes approaching a priority intersection. The greatest risk here would be when it involves high-speed traffic, such as left-turners not expecting to see a cyclist in their lane. Therefore, it may be prudent to only apply the rule to urban roads with speed limits of no more than 60 km/h. However, the alternative of expecting cyclists to remain in the through-lane may be even less tenable in a high-speed environment. Ultimately, the best solution is to provide adequate separate provision for cyclists, e.g. a through cycle lane, or a separated facility.

3.9 Overall Conclusion

Overall the proposed Rule change has

- generally positive effects on people driving

- mostly positive effects on people cycling
- neutral effects on people walking

It is recommended that this Rule be implemented universally across New Zealand via a change to the Road User Rule, with the additional introduction of an exception sign where the practice is not appropriate. The “LEFT LANE MUST TURN LEFT” sign used in Australia is a good model for implementing exceptions to this Rule in New Zealand.

4 Rule change 4: Allowing cyclists to pass slow moving traffic on the left

4.1 Overview of proposed Rule change

Under this Rule change, people cycling alongside other slow-moving traffic in the same kerbside lane would be able to pass them on the left hand side (also colloquially known as “undertaking”). This is particularly relevant in congested areas where traffic may be operating in a stop-start manner at a slower average speed than a typical cyclist (see Figure 4-1).



Figure 4-1: Cyclist undertaking slow moving vehicles on Riccarton Road

Figure 4-2 shows the cycling behaviour that the rule change would seek to legalise; this would apply for cycling in the leftmost lane whether or not this is adjacent to parking. The end result would give the same legal ability to pass as if there were a marked cycle lane in the same position on the road.

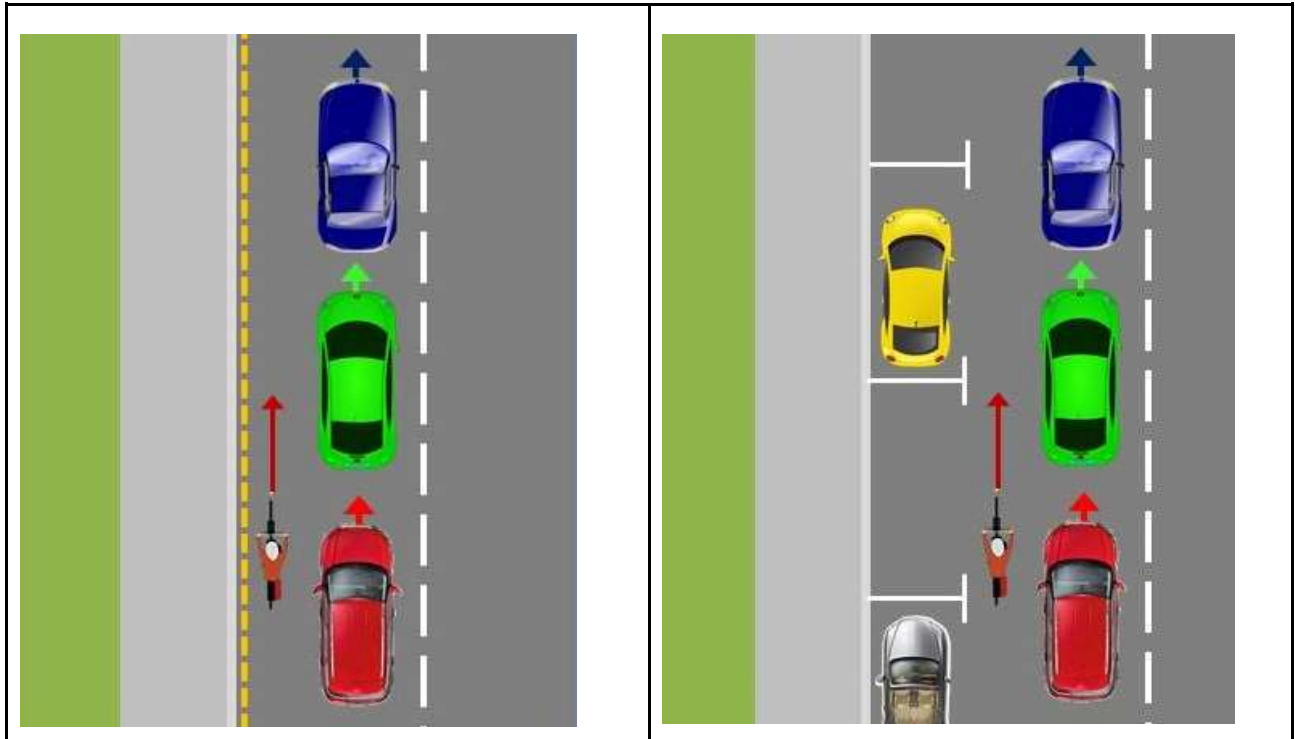


Figure 4-2: Proposed Rule for passing on the left

Note that the same principle could be applied to cyclists passing to the right of traffic in the rightmost lane on a one-way street; however, this is already a legal manoeuvre. The possibility of cyclists travelling between two lanes of traffic (and therefore passing on both the left and the right at the same time) is considered 'lane splitting' and covered separately in Rule change 5.

4.2 Likely benefits of the Rule change

The expected benefits from introducing this Rule would include:

- Allowing cyclists to get past slow-moving traffic to advanced cycle storage facilities;
 - Meaning they are in a safer position, more visible to traffic
 - also, reducing their exposure to traffic fumes, as they are no longer directly behind vehicles
- Allowing cyclists to ride without being held up by slow-moving traffic
- Legitimising an already widespread practice by many riders (typically done for practical reasons), which may reduce motorist antagonism
- Eliminating the inconsistency implied by the current legislation

These (and any identified concerns) are discussed in more detail below.

4.3 Existing NZ Legislation

Section 2.6 of the Land Transport (Road User) Rule specifies general requirements about passing other vehicles (regardless of the situation) that are pertinent to remember (**emphasis** added):

(1) A driver must not pass or attempt to pass another vehicle moving in the same direction unless—

- (a) the movement can be **made with safety**; and*
- (b) the movement is made with **due consideration for other users of the road**; and*
- (c) sufficient clear road is visible to the driver for the passing movement to be completed without impeding or being likely to impede any possible opposing traffic; and*

(d) until the passing movement is completed, **the driver has a clear view of the road and any traffic on the road for at least 100 m** in the direction in which the driver is travelling.

(2) Subclause (1)(c) and (d) does not apply if the passing vehicle and the vehicle being passed are in different lanes and are, throughout the passing movement, either on a one-way road or on the same side of the centre line.

(3) A driver must not, when passing another vehicle moving in the same direction, move into the line of passage of that vehicle until the manoeuvre can be made safely and without impeding the movement of that other vehicle.

Section 2.8 of the Land Transport (Road User) Rule states with respect to passing on the left (**emphasis added**):

(1) A driver **must not pass or attempt to pass on the left** of another vehicle moving in the same direction except in accordance with this clause.

(2) In any case in which the movement referred to subclause (1) may be made,—

(a) the 2 vehicles must be in **different lanes**; or

(b) the overtaken vehicle must be **stationary** or its driver must have given or be giving the prescribed signal of that driver's **intention to turn right**; or

(c) if the overtaken vehicle is a light rail vehicle moving in the same direction, the light rail vehicle must not be—

(i) signalling an intention to turn left or to stop; or

(ii) stationary for the purposes of allowing passengers to alight or board.

Note that the term “driver” includes also cyclists. Also, parking spaces are generally not legally considered a separate lane (unless within a part-time bus/transit lane), so riding through empty parking spaces is not considered riding in a “different lane”. Therefore, cyclists are not allowed to pass on the left of a slow moving traffic queue unless there is a dedicated cycle (or bus/transit) lane marked. In practice, many traffic lanes (in particular, kerbside lanes) are often wide enough to make marking a cycle lane physically possible but have not been marked as such; as a result, the mere absence of a marked line changes the ability to “undertake” legally.

Cyclists may legally pass traffic that is stationary, but the moment it starts moving again they are not allowed to. In congested traffic, where vehicles are alternately moving then stopping, this makes it practically difficult (and counterintuitive) for an otherwise unimpeded cyclist to comply with existing legislation.

4.4 Other Relevant Literature/Legislation

The Cycling Action Network (CAN) are aware of a number of cases where cyclists have been cited by the Police for passing on the left after colliding with opposing motor vehicles turning right through slow-moving traffic.

In Australia, the road rules (clause 141) exempt cyclists from the restriction of passing on the left, except if the vehicle being passed is signalling to turn left:

(1) A driver (**except the rider of a bicycle**) must not overtake a vehicle to the left of the vehicle unless:

(a) the driver is driving on a multi-lane road and the vehicle can be safely overtaken in a marked lane to the left of the vehicle; or

(b) the vehicle is turning right, or making a U–turn from the centre of the road, and is giving a right change of direction signal and it is safe to overtake to the left of the vehicle; or

(c) the vehicle is stationary and it is safe to overtake to the left of the vehicle.

(2) The rider of a bicycle must not ride past, or overtake, to **the left of a vehicle that is turning left** and is giving a left change of direction signal.

One potential issue is in the situation where a motor vehicle has passed a cyclist (whilst signalling left) and then promptly slows down to turn left. If this manoeuvre is made relatively quickly then it may be difficult for the cyclist to avoid catching up to the motor vehicle again and potentially collide with it. The above wording suggests that the rider may be technically in breach of Rule 141(2) even if their own travel speed didn't change; however, they may be protected via other parts of the Australian Road Rules that require turning drivers to give sufficient warning to others (Rule 46). Similar protection exists under NZ's Road User Rule (clauses 2.3(2) (b) and 2.6(3)), which put an onus on anyone moving from a lane or passing another vehicle to ascertain "*that the manoeuvre may be made safely*".

Tierney¹⁴ (2015) conducted a review of cycling related road rules and legislation for VicRoads (the Road Controlling Authority in Victoria, Australia). One of the recommendations of the review was to consider changing the rule that requires cyclists to give way to left-turning motorists who are indicating; it was cited as a confusing and poorly understood rule.

In the United States, there is a mixture of laws from state to state regarding a bicycle passing another vehicle on the kerbside (right-hand side in the US). In Oregon for example, the statutes were revised in 2005 to allow cyclists to pass on the right (ORS 811.415):

(2) For purposes of this section, a person may drive a vehicle to overtake and pass upon the right of another vehicle under any of the following circumstances:

(c) Overtaking and passing upon the right is permitted if the overtaking vehicle is a bicycle that may safely make the passage under the existing conditions.

Note that the requirement to "safely make the passage" still imposes some onus on cyclists to be wary when (say) vehicles in front of them are indicating a turn across their path.

Many other US states do not provide such an exemption for cyclists to overtake on the right in general, but they are included in general traffic exemptions to overtake traffic turning to the left.

4.5 Existing Observed Practice in NZ

Currently, undertaking behaviour is already very prevalent among observed people cycling in busy traffic. Brief field observations on Riccarton Road (Appendix C) observed two cyclists undertaking slow moving traffic, with no riders staying in the traffic stream, but no further formal monitoring was undertaken. Anecdotally, undertaking of slow moving traffic by cyclists has also been observed frequently by the report authors.

4.6 Effects on Network Efficiency

The potential efficiency impacts of this proposal are:

- Reduced delays to cyclists who would previously stop undertaking, as required by the current Rule, or join the traffic queue
- Delays to a motorist turning right through a gap in traffic (often courtesy of a stopped or slow moving opposing vehicle), who is unsure if there is an oncoming cyclist undertaking the line of traffic
- Delays to a left-turning motorist slowing to turn and waiting for a through-cyclist on their left to pass them first from behind

It is expected that a change in the Road User Rule to allow this behaviour would have a negligible effect on the efficiency of road users. Generally, cyclists are riding alongside motorists in this scenario, so they are not impeding their progress. Technically some turning traffic might be slightly impeded if they have to wait for a cyclist to pass first; however, many may already be waiting for any approaching cyclists now, irrespective of the law. Likewise, while cyclists would technically stand to gain from reduced delays by being able to pass uninterrupted, in practice very few are currently complying with the letter of the law anyway.

¹⁴ Tierney, Paul. 2015. Review of Victorian Cycling Related Road Rules and Legislation. Summary Report for VicRoads. Victoria, Australia.

No detailed modelling was undertaken to consider the effects on traffic performance of introducing this Rule, as there is not expected to be any significant change in existing behaviour.

4.7 Effects on Road User Safety

The potential safety effects of this proposal are:

- Conflicts between a motorist turning right through a gap in traffic and an oncoming cyclist undertaking the line of traffic
- Conflicts between a left-turning motorist slowing to turn and a cyclist undertaking from behind them
- Conflicts between a cyclist and opening car doors (with little room to avoid), either from:
 - adjacent parked cars - most likely to occur (as most drivers who park a car then exit it), and having the greater associated risks, as cyclists may fall into the path of oncoming traffic;
 - or the passenger door of a vehicle in the traffic lane - less likely to occur (uncommon for passengers to exit a car from the traffic lane, also relies on the car being able to stop fully) and less likely to result in the cyclist getting pushed into the path of moving traffic.
- Conflicts between cyclists and pedestrians crossing through gaps in traffic

It is expected that a change in the Road User Rule to allow this behaviour would have a moderate effect on the safety of road users. This is particularly due to the problem of drivers in the slow moving queue stopping or slowing further to leave a gap for opposing drivers to turn through, and these opposing drivers not seeing or thinking to look for cyclists. This is already a problem for cycle and bus lanes adjacent to slow moving queues, and is an even bigger problem for moped and motorbike riders due to their higher speeds. Providing the same legal advantages to all cyclists passing on the left may reduce the caution taken by many riders in this situation (and may also increase their riding speed). This could be mitigated somewhat by adding a requirement that any overtaking on the left must be done in a safe and careful manner (although the existing Road User Rules already require any overtaking to be carried out with safety and due consideration for others).

Similar problems may also be encountered with drivers travelling in the same direction as cyclists, who might turn left or make a lateral shift in position without checking first to their left side for cyclists. Without a marked cycleway, there is little physical cue to remind drivers of their obligations to check. An amended rule (coupled with a suitable education campaign) may encourage more turning motorists to check before turning, even if they have their indicators on.

Crashes relating to this rule will also occur wherever motorists pull into or out of the adjacent lane without seeing (or checking for) a cyclist, or through conflict with adjacent parked vehicles (e.g. opening doors). As many cyclists currently overtake in this way, a rule change is unlikely to result in a significant increase in such crashes.

Interrogation of cycle crash data from CAS (2011-15) found a maximum of 311 injury crashes possibly relating to this rule, based on the movement types AA, AC, AG, AO, EE, FA, FD, FE, FF, GB, GF, GO, MD, ME and MF involving cyclists near an intersection. However, it is expected that the vast majority of crashes in this subset were not due to cyclists undertaking slow moving traffic. This subset includes overlap with some of the other rules being analysed and is likely to include crashes that aren't relevant to any of the rules. Without analysing the individual crash reports, it is not possible to tell whether there was a cycle lane present and what the traffic conditions were like (e.g. this subset will include crashes where a fast moving vehicle cut through the cycle lane and sideswiped a cyclist). However, it is noted that **31** crashes had "*overtaking on left without due care*" as a factor code (158) for the cyclist; these included a mix of left-turn sideswipe (GB) and right-turn against (LB) movements.

As far as can be ascertained, only **two** fatal cycle crashes in New Zealand since 2006 could be attributed to a cyclist overtaking a moving vehicle on the left (Tauranga, 2009; Auckland, 2010). In the first case, the rider was to the left of a truck approaching a roundabout; the truck initially overtook the cyclist but was then caught up by the rider. In the second case, a rider overtaking slow traffic on the left has been hit by a parked car door and fallen under a truck. There have been other cases of cyclists overtaking on the left and then being fatally struck, but these involved stationary motor vehicles to their right.

No significant effects have been identified with pedestrians. Pedestrians crossing through gaps in slow-moving traffic may possibly only focus on looking for a gap in the general traffic and not notice a cyclist

alongside. However, this is already the typical situation and so may not change greatly if current cycling behaviours do not really alter after this rule change. Interrogation of CAS (2011-15) found only 12 pedestrian crossing crashes with cyclists (movement types NA, NB) where pedestrians were deemed to be stepping out suddenly or “heedless of traffic” (factor codes 711-717); none noted cyclists as “overtaking without due care”.

As the majority of cyclists currently cycle to the left of through-traffic irrespective of the traffic speed, a rule change is unlikely to result in a significant increase in crashes related to this behaviour. Furthermore, any increase in these crashes, is expected to be outweighed by the reduction in conflicts that would occur as a result of actively requiring cyclists to mix with the faster moving traffic in the through lane instead (and the resulting reduction in cycling attractiveness).

4.8 Implementation Issues

There are two main ways to introduce this Rule; either:

- General permission to do so (unless signs prohibit it at certain locations)
- Permission to do so only when signs/markings allow it at certain location

The second method mentioned above (permission by exception only) mean that the proposed Rule could initially be introduced at limited trial sites by introducing and legislating a sign or marking to designate where it was appropriate. However, in practice there are already a large number of locations in New Zealand where this behaviour is probably appropriate and (more pertinently) where it is already largely happening (remembering that it is already legal to overtake stationary or right-turning traffic on the left). Therefore, a trial is unworkable and will probably not achieve any significant change in existing behaviour there or elsewhere. If there are completely unsuitable locations for this behaviour then it may be more cost-effective to sign them as exceptions to a general rule.

No new signage or markings would be required to implement this Rule universally (i.e. by changing the Road User Rule). It is noted however, that the potential risks from crossing traffic could be reduced by further marking of cycle conflict areas across side roads (coloured surfacing, cycle symbols), or by improving inter-visibility between right turning drivers and two-wheeled riders (e.g. setting queued traffic back with hold lines) as per the Dominion Road trials undertaken in Auckland some years ago¹⁵.

It would not be necessary to initially introduce the Rule at limited trial sites first (i.e. by introducing and legislating a sign/markings to designate where it was appropriate). In practice, this change of rule can already be achieved by marking a cycle lane in the desired location.

Following the introduction of such a Rule, it is likely that the behaviour of people cycling and driving would change very little from current practice. There may be somewhat more “undertaking” behaviour by cyclists, and possibly higher passing speeds by some riders. These effects could potentially be mitigated by improving inter-visibility as noted above.

It may be appropriate to consider prohibiting cyclists from passing vehicles that have adequately signalled a left turn at intersections and driveways. By definition, “adequately” would mean that a turn signal had been displayed for a sufficient period of warning time for any approaching riders (e.g. Road User Rule clause 3.10 requires 3 seconds warning when signalling). Note that, if the requirements did not state that the vehicles had to actually be at an intersection or crossing, then a cyclist would be unable to pass a queue of traffic in a left turn lane who are already signalling well before their turn.

Introduction of this Rule should go hand in hand with public education informing motorists of their obligations when travelling along or turning across potential cycling routes and reminding cyclists to still take care when crossing such conflict points.

4.9 Overall Conclusion

Overall the proposed Rule change has

- mostly neutral effects on people driving
- generally positive effects on people cycling

¹⁵ Newcombe D. 2012. “Addressing cycle and motorcycle bus lane crashes”, *IPENZ Transportation Group Conference*, Rotorua, 18-21 March 2012.

- negligible effects on people walking

It is recommended that this Rule be implemented universally across New Zealand via a change to the Road User Rule. This could be by introducing an additional exemption in clause 2.8(2).

A good model for implementing this Rule in New Zealand can be found in the Australian Road Rules clause 141(1.) – as stated in section 4.4 above. It may be prudent to also include a clause that requires the cyclist to undertake such a manoeuvre safely and cautiously, for example, as stated in the Orgeon Road Statutes (ORS 811.415:2c), although this is already expected by the existing overtaking Rules in NZ. An additional requirement not to pass vehicles clearly indicating to turn left should also be considered.

5 Rule change 5: Allowing cyclists to lane split when filtering to the front of a queue of traffic

5.1 Overview of proposed Rule change

Under this Rule change, people cycling would be able to ride between two lanes of traffic, typically following the lane line (also known as “lane splitting” or “filtering”), to avoid getting held up at intersections or on busy streets. A common scenario is for a through-cyclist to travel between a lane of left-turning traffic and a lane of through-traffic, particularly where the traffic is moving slowly in a stop-start manner or queued on approach to an intersection. However, there are also other scenarios where cyclists may wish to travel between lanes of slow traffic ultimately travelling in different directions. Depending on their relative position in the lanes, the cyclist may or may not be legally passing traffic (see Figure 5-1).



Figure 5-1: A cyclist travels between the lanes on Madras St, Christchurch



Figure 5-2: Cyclist lane-splitting between stationary traffic queues to reach limit line (Bealey Ave, Christchurch)

Figure 5-3 shows the cycling behaviour the proposed rule change would enable; two examples are given, a cyclist lane splitting between a left turn lane and a through lane (note that this cyclist may be intending on turning left or continuing straight through the intersection, in conjunction with Rule 3), and another cyclist lane splitting between a through lane and a right turn lane. In both cases there may be advanced cycle storage facilities that the rider is trying to get to.

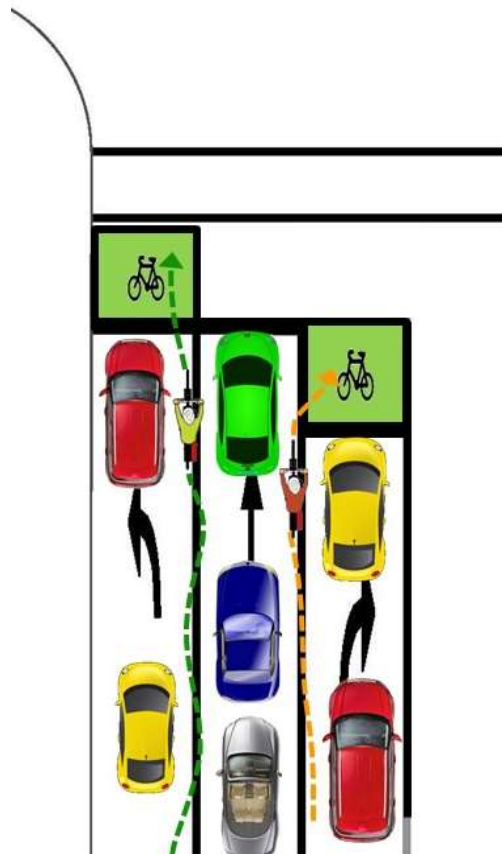


Figure 5-3: Movements allowed by the proposed rule

5.2 Likely benefits of the Rule change

The expected benefits from introducing this Rule would include:

- Allowing cyclists to get through queued traffic to advanced cycle storage facilities
- Letting cyclists get into a more visible position with respect to adjacent motorists
- Allowing cyclists to ride without being held up by slow-moving traffic
- Legitimising an already widespread practice by many riders (typically done for practical reasons), which may reduce motorist antagonism
- Eliminating the ambiguity implied by the current legislation

These (and any identified concerns) are discussed in more detail below.

5.3 Existing NZ Legislation

Section 2.3(2) of the Land Transport (Road User) Rule states (**emphasis** added):

A driver, when driving on a road marked in lanes,—

*(a) must drive as far as practicable **entirely within a lane** except when complying with subclause 2.1(2) or when changing lanes; and*

(b) must not move from a lane until he or she has first ascertained that the manoeuvre may be made safely.

[Note that subclause 2.1(2) refers to keeping as far left as practicable if impeding the normal flow of traffic – not relevant to this discussion]

By implication, riding *along* a lane line is not specifically allowed in general by this clause.

In the case of slow-moving or stopped traffic, a cyclist who is lane splitting would be simultaneously passing to the left and right of other traffic. Recalling the general requirements for passing already

mentioned in section 4.3 of this report, Sections 2.7 and 2.8 of the Land Transport (Road User) Rule, relating to passing on the right and left, state:

2.7 Passing on right

A driver must not pass or attempt to pass on the right of another vehicle moving in the same direction when—

*(a) **approaching or crossing an intersection unless—***

*(i) the roadway is marked in lanes and **the driver can make the movement without the driver's vehicle encroaching on a lane available for opposing traffic**; or*

*(ii) in any other case, the driver can make the movement **with safety and with due consideration** for users of the intersecting road; or*

(b) approaching or passing a flush median, unless the driver—

(i) intends to turn right from the road marked with the flush median into another road or vehicle entrance; or

(ii) has turned right onto the road marked with the flush median; or

(iii) can make the entire movement without encroaching on the flush median.

2.8 Passing on left

(1) A driver must not pass or attempt to pass on the left of another vehicle moving in the same direction except in accordance with this clause.

(2) In any case in which the movement referred to subclause (1) may be made,—

*(a) the 2 vehicles **must be in different lanes**; or*

*(b) the **overtaken vehicle must be stationary** or its driver must have given or be giving the prescribed signal of that driver's intention to turn right; or*

(c) if the overtaken vehicle is a light rail vehicle moving in the same direction, the light rail vehicle must not be—

(i) signalling an intention to turn left or to stop; or

(ii) stationary for the purposes of allowing passengers to alight or board.

(3) If the roadway is marked in lanes, the driver may make the movement referred in subclause (1) only if the driver's vehicle does not encroach on a lane that is unavailable to a driver.

Note that the term “driver” includes also cyclists. Lane-splitting stationary traffic would appear to be already legal from the above two clauses. Section 3.2 appears to also indirectly acknowledge that lane splitting by cyclists is common practice:

(5) While a steady red signal in the form of a disc is displayed or 2 alternately flashing red signals in the form of a disc are displayed,—

(a) a driver of a vehicle facing the signal or signals must not enter the controlled area, but a cyclist may enter ahead of a marked vehicle limit line and stop behind a marked cycle limit line:

Advanced Stop Boxes (ASBs), which are referred to by clause 5, can be provided with and without an approaching cycle lane, and most ASBs in New Zealand don't have this approach cycle lane, which is permissible in the relevant technical guidance. In the cases where no approach cycle lane is provided, it will almost always require lane splitting (or undertaking the left-hand lane) to be able to execute such a manoeuvre to reach an ASB, but if a cyclist reaches the limit line first, then there would generally be no need to provide an ASB in the first instance. In Wellington, an attempt has been made using narrow strips of coloured surfacing to encourage motorists to leave space for this behaviour to occur (Figure 5-4), but technically there is no legal significance to this marking.



Figure 5-4: Green strip leading to ASBs, Wellington - no legal significance

The rules are clear that cyclists must stay within a lane, rather than riding on the lane line. In practice, cyclists would rarely ride on the line for the entire length of such a manoeuvre - it is technically challenging to cycle a perfectly straight line and this is made more difficult by raised thermoplastic line markings and reflective pavement markers. The relative positioning of vehicles generally makes one side more convenient than the other in any given location, and cyclists may therefore cross the lane line multiple times whilst lane splitting – effectively repeatedly changing lanes incidentally.

Thus, a cyclist who is lane splitting slow-moving traffic is effectively passing traffic on the right and / or on the left, depending on which side of the lane line they're riding on. The rules are clear that cyclists are not allowed to pass on the left of a slow moving traffic queue unless there is a dedicated cycle lane (but passing stationary traffic is allowed); this issue has been dealt with separately in the discussion of Rule change 4. For cyclists passing on the right, it could be argued that the relevant criteria can be met. But, as discussed above, it is unlikely that many cyclists could perform "lane-splitting" manoeuvres by remaining consistently to the left of the lane line and thus only passing traffic to the right. However, the legalisation of left-side undertaking (Rule change 4), if agreed to, would effectively make lane-splitting by bikes allowed anyway.

Another variation of lane splitting is when a cyclist is riding between faster moving lanes of traffic; this behaviour may be deemed safer by the rider than attempting to join either line of traffic (although that is debatable). In this case, the *other traffic* is overtaking the cyclist; if the cyclist is positioned just in the left-hand lane then technically the adjacent traffic is (illegally) passing it on the left. If the cyclist is positioned just in the right-hand lane, then the movement is legal (assuming that the rider is not impeding the normal flow of traffic).

5.4 Other Relevant Literature/Legislation

In Victoria, Australia, the term "lane filtering" refers to motorcycles riding between lanes or lines of slow moving traffic in the same direction, or between traffic and parked vehicles. Lane filtering is permitted under specified conditions of the Victoria Road Rules (Rule 151A/B); namely that they travel no faster than 30 km/h, it is "safe to do so", and there isn't a 'No Motorcycle Lane Filtering' sign¹⁶ (Figure 5-5). While cyclists could comply with similar specified conditions, the Rules do not currently include any provision for cyclists to lane filter.

¹⁶ VicRoads (2016). Motorcycles. A summary of the key road rules for riding motorcycles, <https://www.vicroads.vic.gov.au/safety-and-road-rules/road-rules/a-to-z-of-road-rules/motorcycles>



Figure 5-5: No motorcycle lane filtering sign, Victoria

In Washington DC, the legislation allows cyclists to split lanes. Section 1201.3(b) of the District of Columbia Municipal Regulations (DCMR) states:

A person operating a bicycle may overtake and pass other vehicles on the left or right side, staying in the same lane as the overtaken vehicle, or changing to a different lane, or riding off the roadway, as necessary to pass with safety.

: :

(c) If a lane is partially occupied by vehicles that are stopped, standing, or parked in that lane, a person operating a bicycle may ride in that or in the next adjacent lane used by vehicles proceeding in the same direction.

No literature could be identified anywhere that discussed the introduction of this Rule in Washington DC, nor of the effects of bicycle lane splitting anywhere else in the world.

5.5 Existing Observed Practice in NZ

Currently, lane splitting behaviour is already very prevalent among observed people cycling.

As mentioned for Rule 3, one cyclist (out of 6) was observed to lane split while travelling east on Bealey Avenue at Madras Street during an evening peak period observation (Appendix A). Also, two cyclists (out of 16) were observed to lane split while travelling along Riccarton Road at Clarence Street / Straven Road during a morning peak period (Appendix C). Anecdotally, lane splitting by cyclists through stopped traffic or slow-moving queues has also been observed frequently by the report authors.

It is interesting that some recent online discussion on cycling advocacy pages about these proposed Rule changes indicated that many people didn't know that lane splitting in general was currently illegal in New Zealand (notwithstanding the specific case of stationary traffic).

5.6 Effects on Network Efficiency

The potential efficiency impacts of this proposal are:

- Reduced delays to cyclists who are able to avoid waiting for queued or slow-moving traffic
- Delays to traffic who might hesitate to move faster or to change lanes when in the vicinity of a lane-splitting cyclist.

It is expected that a change in the Road User Rule to allow this behaviour would have a negligible effect on the efficiency of road users. This is due to the fact that the practice is already quite prevalent and has only limited potential to affect the movement of other road users. Therefore, no detailed modelling was undertaken to consider the effects on traffic performance of introducing this Rule.

5.7 Effects on Road User Safety

The potential safety effects of this proposal are:

- Conflicts between a cyclist and adjacent vehicles whilst lane splitting, particularly if a vehicle suddenly shifts lateral position or the gap is too narrow
- Conflicts between a cyclist and a vehicle in front or behind of them when attempting to move to or from a lane-splitting position to another part of the roadway.
- Conflicts between cyclists and pedestrians crossing through gaps in traffic

It is expected that a change in the Road User Rule to allow this behaviour would have a moderate effect on the safety of road users. This is due to the uncertainties involved of not having a dedicated space for cyclists moving between two lanes of live traffic. In particular, lane splitting in high-speed traffic (i.e. where motorists are passing the cyclist) would need to be carefully considered.

Many confident cyclists currently behave in this way. While it is expected that only a small proportion of less confident cyclists would adopt lane splitting behaviour if it were officially legalised, the risk of a serious injury crash or fatal crash involving the less confident cyclists is of concern with this rule change. It will be particularly important with such a rule change that cyclists are educated not to lane split until they have the necessary experience and can judge were it is safe or not to do this

Providing a clear legitimacy to all cyclists who are lane splitting may reduce the caution taken by many riders in this situation (and may also increase their riding speed). This could be mitigated somewhat by adding a requirement that any lane splitting must be done in a safe and careful manner (whilst acknowledging that the existing Road User Rules already require any overtaking to be carried out with safety and due consideration for others).

However even with education there is a concern some less experienced cyclists will lane split and will find themselves in a compromised position where they will be crushed between vehicles, including heavy vehicles, that have known blind-spots (especially on the left side of the vehicle). Unlike Rule 4 cyclists do not have an escape route when between two moving vehicles (where as when riding alongside the berm and parked cars there is normally an escape route if a vehicle moves laterally in the lane). We believe this has more potential than the other rule changes to lead to a serious injury or fatal crash.

Interrogation of cycle crash data from CAS (2010-15) found a maximum of 86 injury crashes possibly relating to this rule, based on the movement types AA, AC, AG, FA, FD, FE and FF involving cyclists near an intersection. However, it is expected that this subset includes many crashes where the cyclists were not lane-splitting. This subset includes overlap with some of the other rules analysed and is likely to include crashes that aren't relevant to any of the rules. Without analysing the individual crash reports, it was not possible to tell whether the cyclist was keeping within a particular lane (i.e. vehicular cycling) or splitting between two lanes. **No** crashes identified under the most likely overtaking factor codes (150,151,156,157,159) seemed to be related to cyclist lane-splitting behaviours, which suggests that either reporting isn't accurate enough for this to be distinguished from other crash types (not all Police officers necessarily use these factors to describe a lane-splitting crash) or it isn't currently a problem.

However, given the safety concerns it is suggested that a more detailed investigation of the CAS Police reports be undertaken to determine the extent of this problem. A review of coroners' reports on fatal cycle crashes should also be undertaken to see whether the current illegal behaviour has resulted in such crashes in the last ten years.

Conversely, requiring cyclists through enforcement to comply with the rules as they are currently written could result in them having to use through-traffic lanes that may be both busy and operating at a high speed. This could result in a much higher number of crashes than are currently recorded, but would also result in using a bike becoming untenable for many due to the increased risks.

As far as can be ascertained, only **one** fatal cycle crash in New Zealand since 2006 might be attributed to a cyclist lane-splitting (Auckland, 2011). The rider was to the left of an SUV and trailer and to the right of a car; the cyclist struck the rear of the trailer after crossing through a multi-lane intersection. We do though recommend that some additional analysis be undertaken of the crash data.

No significant effects have been identified with pedestrians. Pedestrians crossing through gaps in slow-moving traffic may possibly only focus on looking for a gap in the general traffic and not notice a cyclist alongside. However, this is already the typical situation and so may not change greatly if current cycling

behaviours do not really alter after this rule change. As discussed in section 4.7, very few pedestrian crossing crashes with cyclists in this kind of scenario were identified.

The main concern with this rule change is that some less confident cyclists, such as school children, will lane split. With it being legal they may be more likely to lane split and will expect this to be safe. The additional risk of this rule change can-not be determined by the historical crash data. The concern is that if cyclists get caught out by lane splitting there is not normally an escape route between two lanes of moving traffic. This rule is also not consistent with keeping to the left of a road and to keeping at least 1m spacing in urban areas between cyclists and motor-vehicles. It would be hard to teach when and when not to lane split safely. Hence on safety grounds we do not believe this rule change should proceed.

5.8 Implementation Issues

There are two main ways to introduce this Rule; either:

- General permission to do so (unless signs prohibit it at certain locations)
 - Could include specific requirements on the context, e.g. only through queues of stationary traffic.
- Permission to do so only when signs/markings allow it at certain location

No new signage or markings would be required to implement this Rule universally (i.e. the first option), other than a new site exception sign.

The second method mentioned above (permission by exception only) mean that the proposed Rule could initially be introduced at limited trial sites by introducing and legislating a sign or marking to designate where it was appropriate. However, in practice there are already a large number of locations in New Zealand where this behaviour is probably appropriate and (more pertinently) where it is already largely happening. Therefore, a trial will probably not achieve any significant change in existing behaviour. If there are completely unsuitable locations for this behaviour then it may be more cost-effective to sign them as exceptions to a general rule (e.g. using something similar to the Australian sign for motorcycle filtering).

It would not be necessary to initially introduce the Rule at limited trial sites first (i.e. by introducing and legislating a sign/markings to designate where it was appropriate). In practice, this change of rule can already be achieved by marking a cycle lane in the desired location (although roadway widths may constrain the ability to provide best-practice lane widths).

The greatest risk for lane-splitting is when the adjacent traffic is travelling at high speed; for example, the chance of serious injury could be quite high on a 100 km/h road if the manoeuvre went wrong. One option could be to only allow lane-splitting where a cyclist is passing adjacent (stopped or slow-moving) traffic (as opposed to being passed); however, this situation could change quite suddenly if the traffic starts moving freely again and the cyclist finds themselves now being overtaken by the same traffic. A more pragmatic approach might be to only allow lane-splitting behaviour in lower-speed roads with speed limits no greater than 50 or 60 km/h. However, it could be argued that cyclists in higher speed situations are even less likely to consider the alternative of joining the general traffic stream, given the inherent dangers of that. It should also be remembered that introducing proposed Rule 4 (allowing overtaking on the left) would effectively also allow cyclists to lane-split to pass other traffic.

Pragmatically speaking, the above discussion puts some onus on RCAs to provide adequate cycling provision where lane splitting could be a serious risk for cyclists. These measures might include: installing separate cycle lanes or at least advisory coloured strips (as per Wellington) or not installing advanced stop boxes in locations where it is practically difficult to get to them by bike in busy traffic.

Following the introduction of such a Rule, it is likely that the behaviour of people cycling and driving would change very little from current practice. There may be somewhat more lane-splitting behaviour by cyclists, and possibly higher passing speeds by some riders. These effects could potentially be mitigated by specifying that adequate care be taken when carrying out this manoeuvre. Other riders may still be reluctant to do a lane-splitting manoeuvre due to their perceived risk.

Introduction of this Rule should go hand in hand with public education informing motorists of their obligations when travelling along or turning across potential cycling routes and reminding cyclists to still take care when crossing such conflict points or making their way between traffic. It should be noted that under the proposed Rule there is still no obligation by motorists to make room between lanes for safe lane splitting, so cyclists will still have to use their judgement about when it is appropriate.

It will be necessary to ensure that the wording of the lane splitting rule and subsequent public education is consistent with the campaign to achieve minimum safe passing distances. A clear distinction needs to be made between the two situations (cyclists choosing to lane-split and motorists overtaking cyclists); this could be tied into the speed environment and road layout. For example, safe passing distance requirements could apply to cyclists riding adjacent to the edge of seal, kerb or parking, whereas lane-splitting is concerned with cyclists moving through slow-moving or stationary queues at the approach to an intersection.

It should be noted that similar lane splitting behaviour is also common amongst motorcycle and moped riders; again technically illegal in New Zealand depending on the specific vehicle positioning. The introduction of a cyclist lane-splitting rule may increase calls to do the same for motorised two-wheelers, although it is acknowledged that the speeds involved (and thus, the risks) can be somewhat greater.

5.9 Overall Conclusion

Overall the proposed Rule change has

- mostly neutral effects on people driving
- some positive effects on people cycling
- negligible effects on people walking
- an unacceptable risk of serious injury and fatal crashes among less experienced cyclists

We therefore do not recommend implementing this Rule universally across New Zealand via a change to the Road User Rule. We also do not recommend trials of this rule.

6 Rule change 6: Allowing cyclists to turn left and/or ride across the top of a T intersection despite being faced with a red signal

6.1 Overview of proposed Rule change

Under this Rule change, people cycling would be allowed to make a left turn at a signalised intersection (hereon referred to as “Rule 6L”), or travel across the “top” of a signalised T intersection (“Rule 6T”), at any time (typically after first checking that their way is clear). In essence, these manoeuvres would be similar to that allowed at a STOP or GIVE WAY-controlled intersection, i.e. a cyclist may make the movement after (possibly stopping and) first checking that the way is clear. At the moment, the only way to achieve a similar effect at a signalised intersection is to create an off-road “bypass” cycleway link; some examples have been constructed previously in Christchurch (see Figure 6-1 & Figure 6-2).



Figure 6-1: Example of left-turn cycle bypass, Waltham/Moorhouse intersection, Christchurch



Figure 6-2: Example of a “top of T” cycle bypass, Buckleys/Russell intersection, Christchurch

Figure 6-3 illustrates one cycling behaviour that would be permitted under the proposed Rule 6L change, i.e. the cyclist at the bottom is allowed to proceed left through the intersection even though the general traffic from the same approach has a red signal (a similar manoeuvre would be allowed by left-turning cyclists from the right-hand leg too). A cyclist would still need to give way to any crossing pedestrians and vehicles who are legally making their movements. Note that it is possible that, when approaching and departing on one-way streets, a similar exemption could also apply to cyclists turning *right* from the right-hand side.

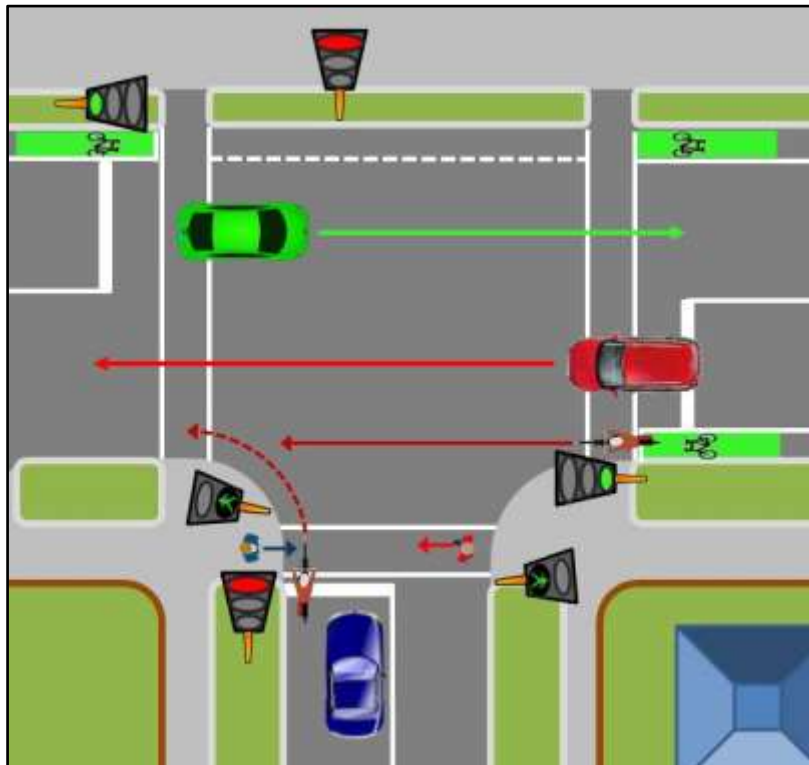


Figure 6-3: Proposed left-turn movement allowed for cyclists

(NB: this rule would also apply to left-turns from the right-hand road)

Figure 6-4 illustrates the cycling behaviour that would be permitted under the proposed Rule 6T change, i.e. the cyclist is allowed to proceed across the head of the T intersection even though the general traffic from the same approach has a red signal. A cyclist would still need to give way to any crossing pedestrians and vehicles who are legally making their movements.

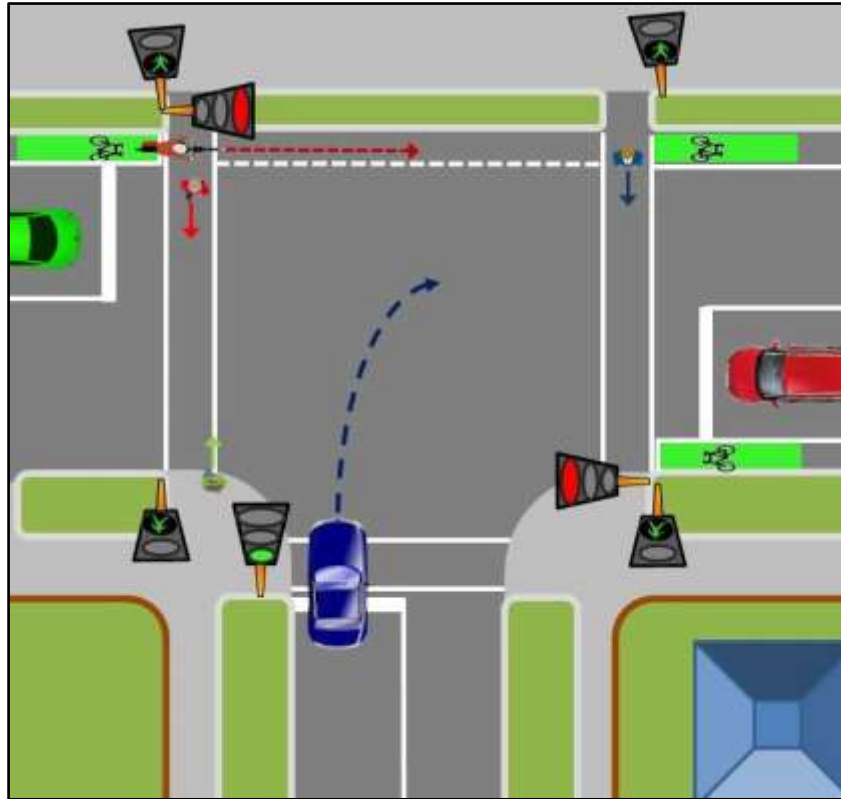


Figure 6-4: Proposed “top of the T” movement allowed for cyclists

6.2 Likely benefits of the Rule change

The expected benefits from introducing this Rule would include:

- Allowing riders to avoid potential conflicts with adjacent traffic downstream of the intersection.
- Allowing riders to avoid potential conflicts with adjacent traffic and pedestrians when starting off at the same time
- Reducing (arguably unnecessary) delays and stops to riders, thus further encouraging cycling.
- Legitimising a somewhat prevalent practice by many riders (often done for safety reasons), which may reduce motorist antagonism.

These (and any identified concerns) are discussed in more detail below.

6.3 Existing NZ Legislation

Section 3.2(5) of the Land Transport (Road User) Rule states (**emphasis added**):

While a steady red signal in the form of a disc is displayed or 2 alternately flashing red signals in the form of a disc are displayed,—

*(a) a driver of a vehicle facing the signal or signals **must not enter the controlled area**, but a cyclist may enter ahead of a marked vehicle limit line and stop behind a marked cycle limit line:*

(b) pedestrians, riders of mobility devices, and riders of wheeled recreational devices facing the signal or signals must not enter the roadway unless a special signal for pedestrians indicates a green walking human figure symbol.

Section 3.3(3) of the Land Transport (Road User) Rule states:

While a red signal in the form of an arrow is displayed,—

(a) a driver facing the signal must not enter the controlled area to proceed in the direction indicated by the signal:

(b) pedestrians, riders of mobility devices, and riders of wheeled recreational devices facing the signal must not enter the roadway unless a special signal for pedestrians indicates a green walking human figure symbol.

Therefore, cyclists (who fall under “driver”) are currently subjected to the same general restrictions relating to red signals as motorists. Section 3.7 of the Road User Rule also prescribes a similar restriction when red cycle signals are displayed.

However, Section 3.1(2) of the Rule states that:

*If traffic signs have been installed at a place controlled by traffic signals, then, in so far as the instructions given by the traffic signals are inconsistent with those given by the traffic signs, a person (including a pedestrian) using the road at that place must **comply with the instructions given by the traffic signs** that apply to them and not those given by the traffic signals.*

Potentially this could allow a specific sign to override the intentions of the relevant traffic signal (for example, a sign exempting cyclists from a red signal), without changing other parts of the legislation. For clarity however, it may be best to explicitly define such an exemption in the legislation as well.

6.4 Other Relevant Literature/Legislation

In France, road controlling authorities are permitted to install regulatory signs or flashing yellow signals, to allow cyclists to turn right or travel straight ahead at a specific intersection.¹⁷ This is the result of a trial that was undertaken in certain cities (see Figure 6-5). A second trial is now being undertaken in a precinct of Paris to include the possibility of turning left (right turn in NZ) or travelling straight ahead through red signals at certain locations¹⁸. This suggests that, while there isn't a lot of documented evidence surrounding the first trial, French authorities are satisfied enough with the experience that they're ready to consider expanding it to other possibilities.

¹⁷ La Direction de la Sécurité et de la Circulation Routières. 2012. "Une nouvelle signalisation à destination des cyclistes". <http://www.securite-routiere.gouv.fr/connaitre-les-regles/questions-frequentes/une-nouvelle-signalisation-a-destination-des-cyclistes> Last updated 13 August 2012, accessed 7 June 2016. Original french version.

¹⁸ Velib. 2016 "De Nouveaux Panneaux Testés dans le 10e Arrondissement". <http://blog.velib.paris.fr/blog/2016/05/12/de-nouveaux-panneaux-testes-dans-le-10e-arrondissement/> Last updated 12 May 2016, accessed 7 June 2016. Original french version.



Figure 6-5: Example of a sign allowing right-turn-on-red for cyclists, Nantes, France

In Brussels, a trial of signs and signals similar to those used in France, to allow cyclists to turn right or travel straight ahead at a specific intersection was also conducted. The Minister of Mobility ascertained that the rule didn't have the desired effect – *“those who already ran the red light still do, but few of those who didn't run red lights previously have made use of the new possibility.”*¹⁹ (Original quote translated from French)

In the Netherlands, many signalled intersections allow a right-turn-on-red manoeuvre by cyclists at any time, through the use of a specific sign next to the signals (see Figure 6-6; “rechtsaf voor fietsers vrij” = “right turn free for cyclists”).

¹⁹ RTFB. 2015 "Bruxelles: le tourne-à-droite pour les vélos n'as pas eu l'effet espéré" https://www.rtfb.be/info/regions/detail_bruelles-le-tourne-a-droite-pour-les-velos-n-a-pas-eu-l-effet-espere?id=8856730. Last updated 27 January 2015, accessed 7 June 2016. Original french version.



Figure 6-6: Sign next to the signals says “right turn free for cyclists”, Enschede, Netherlands

In Denmark, a trial allowing cyclists to turn right on red has recently been completed at 33 intersections. The intersections were selected based on having separate right-turn and through lanes for cycling, and low pedestrian volumes at potential conflict points. The outcome was favourable and the authorities thus decided to permanently allow cyclists to turn right on red at those specific intersections.²⁰

Pucher and Buehler²¹ indicate that in Odense, Denmark, cyclists are exempt from red traffic signals across the head of the T by means of signage (see Figure 6-7).

²⁰ Copenhagen Post, 2016. “Denmark to permit right turns at red lights for bicycles”, 26 Jul 2016, <http://cphpost.dk/news/denmark-to-permit-right-turns-at-red-lights-for-bicycles.html>

²¹ Pucher and Buehler (2007) “At the Frontiers of Cycling: Policy Innovations in the Netherlands, Denmark, and Germany”. Bloustein School of Planning and Public Policy, Rutgers University. New Brunswick, New Jersey, USA.



Figure 6-7: Cyclists allowed to ride through top of the T, Odense, Denmark (“undtaget” = “except”)

Since 1982, in Idaho USA, cyclists are permitted to treat stop signs as give way signs or (since 2005) proceed through a red signal (NB: for *any* movement, not just kerb-side turns)²². The relevant text in Idaho’s Motor Vehicle statutes states:

49-720. Stopping -- Turn and stop signals

(2) A person operating a bicycle or human-powered vehicle approaching a steady red traffic control light shall stop before entering the intersection and shall yield to all other traffic. Once the person has yielded, he may **proceed through the steady red light with caution**. Provided however, that a person after slowing to a reasonable speed and yielding the right-of-way if required, may cautiously make a right-hand turn. A left-hand turn onto a one-way highway may be made on a red light after stopping and yielding to other traffic.

Four other states also allow this signals exemption, although only after a reasonable period of time has elapsed (i.e. when it is clear that the signal has not detected the bicycle).²³ Holzer²⁴, a lawyer specialising in bicycle crashes in the USA supported the Idaho stop law by stating “*not once in the hundreds of bicycle collision cases I have investigated has the law created an incident.*”

Co²⁵ summarised the benefits of the Idaho legislation:

- It allows cyclists to avoid collisions with right-turning traffic (our left-turning traffic) by getting ahead of traffic waiting to turn.
- Even if they don’t cross the intersection immediately, it allows riders to position themselves in front of stopped motor vehicles to improve their visibility.

²² State of Idaho, 2016. Statute Title 49: *Motor Vehicles*. <https://legislature.idaho.gov/idstat/Title49/T49.htm>

²³ The League of American Bicyclists, 2013. Idaho Stop Laws. <http://bikeleague.org/content/bike-law-university-idaho-stop>. Last updated 22 August 2013, accessed 7 June 2016.

²⁴ Holzer, K. 2016. Bike Law attorney Kurt Holzer makes a compelling case for the "Idaho Stop". <http://www.bikelaw.com/2016/01/27/living-with-stop-as-yield-for-cyclists/> Last updated 27 January 2016, accessed 7 June 2016.

²⁵ Co S. 2007. Stop Sign and Traffic Signal Changes for Cyclists. *Memo to Regional Bicycle Working Group*, Metropolitan Transportation Commission, CA.

- Not having to come to a complete stop and then start again allows cyclists to maintain their momentum.
- It avoids the problem of cyclists not getting detected at traffic signals during quiet times of the day and thus having to go through illegally or wait until a motor vehicle arrives.

Co also noted that such a law can be confusing to children, who are still learning to ride their bikes in traffic and may have difficulty judging a safe gap. However, Idaho practice is to teach young or inexperienced riders to stop and only go with the general signals. Another concern was that this rule perpetuated the image of cyclists as law-breakers, particularly by those not familiar with Idaho's statutes.

"Right turn on red" (RTOR) for general traffic was introduced in many states across North America in the 1970s as a measure to save fuel during the oil crises. Nowadays, RTOR is allowed in all US States, unless otherwise prohibited by a sign or red arrow; the main exception to this is New York City, where RTOR is prohibited unless specifically allowed for by a sign²⁶. Allowing RTOR is also allowed throughout Canada, except Montreal City²⁷. In most states and provinces, *left turn* on red is also allowed where both the entering and exiting roads are one-way.

There has been much debate at introducing (and retaining) this regulation, particularly in certain localities. The main concern has generally been pedestrian safety. The fact that the regulation has been retained by those who initiated it, and adopted by the vast majority of other localities, suggests that North American authorities are satisfied with its safety.

Lord²⁸ studied various agencies in the USA and Canada and concluded that *"the proportion of RTOR crashes is usually very low (less than 0.5% of all crashes in a given jurisdiction) and, in the event of crash, the outcome is generally not severe."*

Charlie Zegeer (who authored FHWA research report "Pedestrian safety at RTOR intersections") commented *"based on all evidence that I have seen, my opinion is that allowing RTOR generally has little, if any, negative impact on pedestrian or bicycle safety at most signalized intersections, as long as it is prohibited at high-risk locations, such as where pedestrian activity is heavy, in school zones, and where sight distance is limited, etc."*²⁹

Bicycles are much lighter and travel at slower speeds than motor vehicles. Therefore, if motor vehicles allowed to turn right on red do not pose a significant threat to pedestrians, it follows that allowing cyclists to turn right on red would not pose a threat either.

In Australia, left turn on red is generally not allowed for any traffic, but Rules are provided that allow for this manoeuvre (for general traffic) when the appropriate sign is present (Rules 56, 59, 62). For example:

62 Giving way when turning at an intersection with traffic lights

(1) A driver turning at an intersection with traffic lights must give way to:

(a) any pedestrian at or near the intersection who is crossing the road the driver is entering; and

(b) if the driver is **turning left at a 'left turn on red after stopping' sign** at the intersection:

(i) any vehicle approaching from the right, turning right at the intersection into the road the driver is entering or making a U-turn; and

²⁶ Retting et al. 2002. Field evaluation of Two Methods for Restricting Right Turn on Red to Promote Pedestrian Safety. ITE Journal January 2002.

²⁷ Libman, Max. 2014. Why can't we turn right on red lights in Montreal? <http://www.themainmtl.com/2014/11/cant-turn-right-red-lights-montreal/> Last updated 20 November 2014, accessed 7 June 2016.

²⁸ Lord, Dominique. 2002. Synthesis on the Safety of Right Turn on Red in the United States and Canada. 82nd Annual meeting of the Transportation Research Board.

²⁹ Zegeer, Charles. 2016. *Pers Comm*. Re: 1090-03 NZ Road User Rule for Pedestrians & Cyclists.

(ii) any pedestrian at or near the intersection who is on the road the driver is leaving

A similar form of rule could be applied to cyclists only, using a sign similar to the Australian one (Figure 6-8).



Figure 6-8: Australian sign allowing left turn on red at a specific location

6.5 Existing Observed Practice in NZ

Currently, red-light running behaviour is somewhat prevalent among observed people cycling. Field observations of the through cyclists across the head of the T on Lincoln Road at Harman Street found that, of the ten cyclists who arrived at a red signal, three ran the red light, one by continuing along the cycle lane and the other two by transitioning onto the footpath. Anecdotally, left-turning by cyclists through red lights has also been observed occasionally by the report authors.

A study of red-light running at five busy central city intersections in Auckland³⁰ found that, while 13%-62% of cyclists at a site ran a red signal, most of this was during the pedestrian “Barnes Dance” phase; conventional red-light running during the traffic phases averaged only 4% (comparable with other travel modes). It was observed that many red-light running cyclists treated the site like a STOP or GIVE WAY, pausing first to check the way was clear before taking an opportunity to go. Many also went just a few seconds ahead of the general green signal, suggesting a desire to get through the intersection slightly ahead of motorists.

In a survey of riders as part of the above study, likelihood to comply with red signals was much less likely for top-of-the-T and left-turn situations than through or right-turn movements. The most commonly cited reasons by people for running red lights when cycling were for safety (to get ahead of traffic before a pinch-point, or to make a difficult manoeuvre) and because they weren’t always detected by the traffic signal sensors. These findings also correspond with similar research in Melbourne, Australia³¹, where cyclists didn’t comply with red-light signals 7% of the time, mainly to turn left or because the intersection did not detect their bike.

6.6 Effects on Network Efficiency

The potential efficiency impacts of this proposal are:

- Reduced delays to cyclists who no longer have to wait for the general green signal.
- Possibly reduced delays to motorists waiting on a red signal who will not have to slow down to let cyclists into a pinch-point first when exiting an intersection.
- Possibly reduced delays to motorists who would have otherwise had to wait for cyclists waiting at an advanced stop box to start up and clear the intersection.
- Possibly additional delays to motorists going on a green signal who have to slow down to let red-running cyclists into a pinch-point first when exiting an intersection.

³⁰ Newcombe D. 2013. Why do Cyclists Run Red Lights? Improving Road User Behaviour at Traffic Signals. *IPENZ Transportation Conference*, Dunedin.

³¹ Johnson M., Charlton J., Oxley J., Newstead S. (2013). Why do cyclists infringe at red lights? An investigation of Australian cyclists’ reasons for red light infringement. *Accident Analysis & Prevention*, Vol.50 pp.840-847. <http://dx.doi.org/10.1016/j.aap.2012.07.2008>

It is expected that a change in the Road User Rule to allow this behaviour would have a negligible effect on the efficiency to vehicular road users. This is due primarily to both of the suggested changes allowing cyclists to continue travelling without obstructing traffic, but only if there is a dedicated space for them to move forward into. Where there is not a suitable space downstream (e.g. a short exit cycle lane ends when parking resumes), it may cause motorists on the green signal to slow down so that space is provided for the cyclist to safely continue.

SIDRA modelling of a signalised T-intersection was undertaken to consider the effects on traffic performance of introducing this Rule. The following assumptions were used for all models;

1. A continuation of the cycle facility was provided on each leg of the intersection.
2. 50 cyclists per hour would travel on each approach, with directional splits consistent with motorised traffic.
3. The SIDRA default of 50 pedestrians per hour was left unchanged.
4. The cycle facilities are one-directional only. Contra-flow facilities were not modelled.

The modelling was divided into further scenarios by modelling an 80/20 and 60/40 traffic split between the main road and side road, with each of those splits then modelled based on high or low traffic volumes. Figure 6-9 displays the layout for all options used.

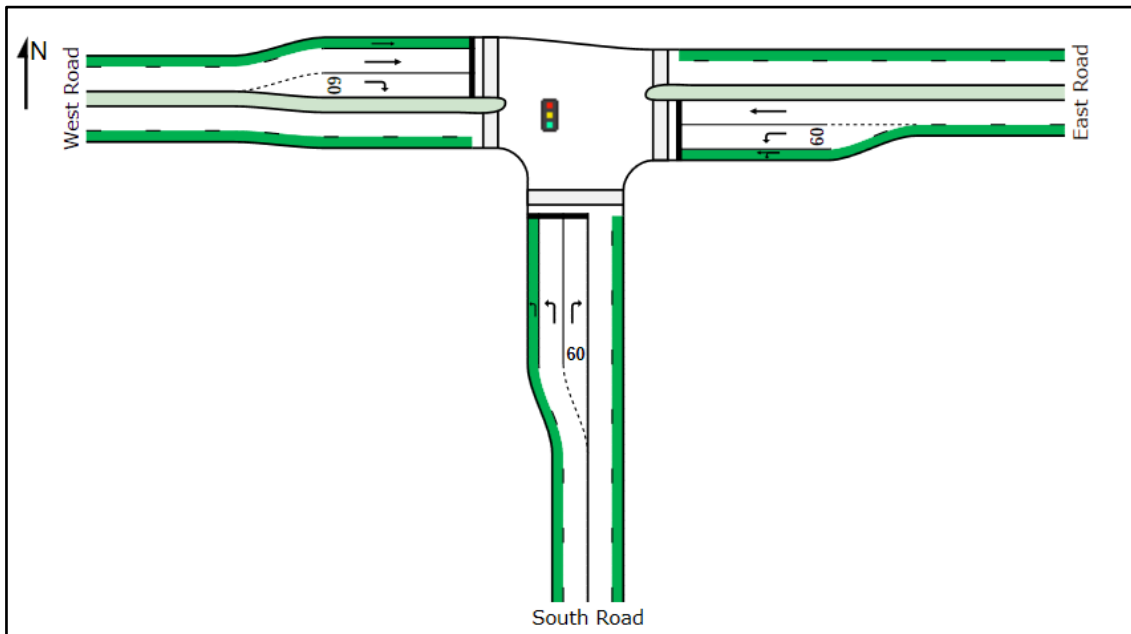


Figure 6-9: Intersection layout as modelled in SIDRA 6.1

In all, four scenarios were modelled; these were:

- Existing rules vs. new rules 80/20 traffic split and low traffic volumes
- Existing rules vs. new rules, 80/20 traffic split and high traffic volumes
- Existing rules vs. new rules, 60/40 traffic split and low traffic volumes
- Existing rules vs. new rules, 60/40 traffic split and high traffic volumes

In both of the low volume scenarios, there was no change to the following metrics for any of the vehicular traffic lanes; lane capacity, degree of saturation, average delay, level of service, or queue lengths. So this provides evidence to support that, on low volume roads, there is no noticeable efficiency delay to motorists. However, there were benefits to be realised for cyclists, who experienced reduced delays and hence reduced queue lengths. These are summarised in Table 6-1, which includes arrows to indicate if a metric increased or decreased in the proposed scenario.

Table 6-1: Summary of benefits to cyclists in a low volume scenario

Scenario	Approach	Capacity (veh/h)	Degree of Saturation (veh/cap)	Average Delay (sec)	Level of Service	95% Queue Length (m)
80/20 existing rule	South Rd	1012	0.026	13.4	LOS B	1.0
	East Rd	2988	0.018	4.9	LOS A	1.2
	West Rd	3009	0.016	4.9	LOS A	1.1
80/20 proposed rule	South Rd	1764 ↑	0.015 ↓	2.9 ↓	LOS A ↑	0.4 ↓
	East Rd	3005 ↑	0.018	2.8 ↓	LOS A	0.7 ↓
	West Rd	3538 ↑	0.014 ↓	1.6 ↓	LOS A	0.5 ↓
60/40 existing rule	South Rd	1416	0.019	8.2	LOS A	0.7
	East Rd	1723	0.031	7.1	LOS A	1.3
	West Rd	1735	0.029	7.0	LOS A	1.2
60/40 proposed rule	South Rd	2281 ↑	0.012 ↓	3.0 ↓	LOS A	0.3 ↓
	East Rd	1746 ↑	0.030 ↓	4.0 ↓	LOS A	0.8 ↓
	West Rd	2440 ↑	0.020 ↓	2.6 ↓	LOS A	0.6 ↓

Table 6-1 shows the greatest benefit for cyclists is on South Road (side-leg of the T-intersection) during the 80/20 traffic split scenario. Their average delay time decreased from 13.4 seconds to 2.9 seconds, as they no longer had to wait to turn left during the shorter green time apportioned for the lower volume side road. The Level of Service also improves from LoS B to LoS A. In the 60/40 traffic split there are smaller gains for cyclists, as South Road now has more green time apportioned, so is not delayed as long as the 80/20 scenario.

It is not understood why SIDRA shows there to be any delays or queuing in the proposed scenarios, as cyclists should be able to travel unhindered; probably it reflects a slight delay in pausing to check that the way is clear of traffic and then giving way to any other traffic or pedestrians who have precedence. But as expected, the modelling does show there are benefits to cyclists from both rule changes.

In the high volume scenario there were again no notable changes to any performance values for vehicular traffic. Table 6-2Table 6- details the changes to for cyclists when the T-intersection is much busier.

Table 6-2: Summary of benefits to cyclists in a high volume scenario

Scenario	Approach	Capacity (veh/h)	Degree of Saturation (veh/cap)	Average Delay (sec)	Level of Service	Queue Length (m)
80/20 existing rule	South Rd	999	0.026	24.2	LOS C	1.8
	East Rd	3976	0.013	4.3	LOS A	1.5
	West Rd	4003	0.012	4.2	LOS A	1.4
80/20 proposed rule	South Rd	1359 ↑	0.019 ↓	9.6 ↓	LOS A ↑	1.2 ↓
	East Rd	3985 ↑	0.013	2.6 ↓	LOS A	1.1 ↓
	West Rd	4280 ↑	0.012 ↓	2.0 ↓	LOS A	0.9 ↓
60/40 existing rule	South Rd	2006	0.013	11.8	LOS B	1.1
	East Rd	2584	0.020	8.9	LOS A	2.0
	West Rd	2602	0.019	8.8	LOS A	1.8
60/40 proposed rule	South Rd	2438 ↑	0.011 ↓	7.1 ↓	LOS A ↑	0.8 ↓
	East Rd	2596 ↑	0.020	5.8 ↓	LOS A	1.5 ↓
	West Rd	2962 ↑	0.017 ↓	4.9 ↓	LOS A	1.4 ↓

Table 6-2 shows again that the greatest benefit for cyclists is on South Road during the 80/20 traffic split scenario. Their average delay time decreased from 24.2 seconds to 9.6 seconds and the Level of Service also improves from LoS C to LoS A. In the 60/40 traffic split there are smaller gains for cyclists, as South Road (side road) now has more green time apportioned, so is not delayed as long as the 80/20 scenario. In the high volume scenario there is also an improvement from LoS B to LoS A for South Road.

Therefore, in all four scenarios tested, SIDRA modelling showed there were no disadvantages for vehicular traffic if the proposed road rules were applied. The only change would be beneficial to cyclists, as they no longer had to wait at red signals any more. The degree of benefit to cyclists will be largely determined by the volume of cyclists on a particular route and the relative green time given to a leg.

6.7 Effects on Road User Safety

The potential safety effects of this proposal are:

- Conflicts between cyclists moving on red and other traffic legally entering the exit leg at the same time.
- Conflicts between cyclists moving across the top-of-T on red and other traffic entering the intersection from a driveway on the top of the T.

- Conflicts between cyclists moving on red and pedestrians legally crossing in front of them.
- Reduced conflicts between cyclists and adjacent motorists both heading for a narrow exit leg, by separating their departure times.
- Reduced conflicts between cyclists and motorists waiting behind them when the signals change.

It is expected that a change in the Road User Rule to allow this behaviour would have a negligible to slight effect on the safety of road users. A key potential scenario for conflict is if there is no dedicated space for cyclists to use when moving through the intersection and on the departure leg. However, the potential increase in crashes between red-light running cyclists and other moving traffic entering the same leg may be counteracted by the **reduction** in crashes between those cyclists and adjacent motorists on the same approach leg had they chosen to wait until the general green signal.

Allowing cyclists to turn left on red signals (Rule 6L) may result in crashes if vehicles overlap the cyclist's space, for example a heavy vehicle making an opposing right turn and encroaching on the cycle lane. This could also occur on the head of a T intersection (Rule 6T), but the more likely threat there is from vehicles entering or exiting driveways on or near the head of the T and not expecting cyclists at that time. This risk could be mitigated by limiting the proposed rule to locations where there is a dedicated space for cycling (e.g. a painted cycle lane) on the departure side; however, this is likely to be a subtlety not obvious to many users unless signed accordingly, and many sufficiently wide roads may not have cycle facilities marked.

The relative severity of a crash involving a red-light running cyclist (whether with a pedestrian or motorist) is likely to be higher in the case of straight-through movements compared with turning movements where the rider has to slow down somewhat. This may mean that, typically, top-of-T movements impose a higher risk than left-turn ones (although for some intersection geometries, the "left turn" may actually be reasonably straight).

A reasonable number of cyclists currently choose to not comply with red signals where they consider they can undertake a safe movement. A rule change may result in a notable increase in this behaviour, although not everyone entitled to go under a changed rule may necessarily do so.

Interrogation of cycle crash data from CAS (2010-15) found only **two** injury crashes relating to a cyclist turning left on red and **three** injury crashes relating to a cyclist travelling along the head of a T intersection against a red signal. **Three** of the crashes featured collisions with pedestrians. The movement types included in the search were GB, KA or KC for left turns on red and GB, HA, LB, KA, KB, MD, NA and NB for head of T crashes. This rule was the easiest to obtain meaningful crash data, based on the intersection type, cyclist movement and whether it was the cyclist or the motorist that ran the red signal. However, it was still difficult to ascertain the movement intention of a cyclist who struck a pedestrian, as the NA/NB codes do not indicate whether the vehicle is travelling straight or about to turn.

As far as can be ascertained, only **one** fatal cycle crash in New Zealand since 2006 might be attributed to a cyclist running a red light (Auckland, 2014). The rider turned to the left against a red signal at a signalised intersection and collided with a crossing truck; however, there is some suggestion that inadequate brakes resulted in the rider being unable to stop in time after having come down a hill. Another cycling fatality in Auckland (2010) also involved a cyclist riding against a red signal but that involved a straight-through movement across a crossroads.

For a reasonably common behaviour it is notable that so few crashes seem to be related to the relevant red-light running behaviours. This suggests that, even with an increase in the numbers of cyclists undertaking these behaviours, there may be a relatively minimal increase in crash numbers.

This viewpoint aligns with Meggs (2010)³², who investigated the safety effects of the Idaho stop rule. In comparing the rate of cycle crashes with cities in other states, the cities in Idaho with this law had at least 30% fewer crashes than the closest comparison city.

6.8 Implementation Issues

There are two main ways to introduce this Rule; either:

³² Meggs J. (2010). *Bicycle Safety and Choice: Compounded Public Co-benefits of the Idaho Law Relaxing Stop Requirements for Cycling*. School of Public Health, Environmental Health Science Division, University of California, Berkeley CA.

- General permission to do so unless signs prohibit it at certain locations
- Permission to do so only when signs allow it at certain locations

In both cases, some new signage would be required to allow for exceptions to the general Rule, either allowing or prohibiting it. It may be in some locations that only part of the Rule would be prudent; e.g. a T-intersection with a busy driveway on the other leg may be appropriate for Rule 6L but not Rule 6T. For the purposes of a trial, Road User Rule cause 3.1(2) may be sufficient to introduce a suitable new sign to indicate where it is allowed or prohibited.

The second method mentioned above (permission by exception only) means that the proposed Rule could initially be introduced at limited trial sites by introducing and legislating a sign to designate where it was appropriate. This seems to be a typical approach adopted by a number of European countries recently. Figure 6-10 suggests a possible sign format that could be used (with “THROUGH” replacing “LEFT TURN” for top-of-T movements); an additional supplementary warning about pedestrians could be added as required.



Figure 6-10: Example of possible trial signage (with optional pedestrian warning plate)

Following the introduction of such a Rule, it is likely that the behaviour of people cycling would change somewhat, with more people on bikes making the “turn on red” manoeuvre. It is likely that the behaviour of people driving would change very little, as they will be generally unaffected by the proposed change. Pedestrians may be slightly more wary when crossing intersections, in case cyclists do not cede priority to them.

Some consideration needs to be given to the required behaviour of red-light running cyclists as they approach the intersection; for example, are they required to come to a complete stop first and check that the way is clear before moving off? Idaho’s legislation allows riders to “*slow to a reasonable speed*” before yielding priority if required, and then they can “cautiously” make their turn. This seems like a pragmatic approach to allowing riders to maintain momentum while still putting the onus of due care on them. However, some consideration will need to be given to how this might work in practice on locations with steep downhill approaches; some additional cyclist education may be in order.

It may be prudent to also consider allowing right turns on red where a cyclist approaches an intersection on the right-hand side of a one-way street and turns into another one-way street. Other scenarios involving one-way streets (e.g. turning right from a one-way street into a two-way street) are probably too risky to allow due to the conflicting traffic movements.

It is possible that some riders could attempt to use a new left-turn-on-red rule to travel straight through an intersection, by first turning left into the side road, doing a U-turn, and then turning left out of the side road. In practice this may result in relatively little gain in time:

- When travelling along a busier road it is likely to have the majority of the overall green signal time anyway, leading to little gain in diverting to the less busy side road
- When travelling along a less busy road, it may be very difficult to quickly (and safely) carry out a u-turn on the busier side road

Nevertheless, this behaviour probably needs to be considered, particularly the safety implications of the u-turn manoeuvres required.

If there is concern about the relative severity of any crashes involving turn-on-red cyclists, one option could be to initially introduce it only in lower-speed environments, possibly only in 30-40 km/h areas. Depending on the results, the Rule could then be introduced to a wider range of streets.

Another manoeuvre that may be of interest to some RCAs (and was raised by AMIG members) is to allow cyclists to ride through an intersection during a pedestrian Barnes Dance or head-start pedestrian crossing phase. At present, this introduces a conflict between pedestrians and cyclists (a class of “vehicle”) that is not allowed to be provided for by signals, due to the provisions of clause 6.4(6) in the Traffic Control Devices Rule. It may be useful to include these situations in the exemptions allowed for cyclists, although it is beyond the scope of this report.

It would be important to educate cyclists on their responsibilities when making a turn on red manoeuvre, namely checking that the way is clear of pedestrians and other road users legally moving through the intersection. Public education should also inform the public in general (as pedestrians and motorists) of the new rights and responsibilities of cyclists. This would be crucial for a potentially contentious rule like this, where uninformed people could take great offence at perceived “law breaking” by cyclists.

6.9 Overall Conclusion

Overall the proposed Rule change has

- Generally neutral effects on people driving
- Mostly positive effects on people cycling
- Mostly neutral effects on people walking

It is recommended that this Rule be implemented initially at limited trial sites in New Zealand via the introduction and legislation of the appropriate signs to allow this. These trial sites should be monitored to assess changes in behaviours and performances over a period of time, compared with a pre-trial period.

A good model for implementing this Rule in New Zealand can be found in the Idaho state legislation (amended to only consider left-turn and top-of-T movements).

7 Summary of Proposed Rule Changes

In summary, the analysis has concluded that:

- Rule 1 (Giving cyclists precedence over traffic when separated cycleways cross side-roads) should be implemented, universally across New Zealand for signalised intersections via a change to the Road User Rule, and either universally across New Zealand or only at limited sites via the introduction of suitable crossing markings/signs at unsignalised intersections (not including roundabouts)
- Rule 2 (Giving pedestrians precedence over traffic when crossing side roads) should be implemented initially at limited trial sites in New Zealand (including shared paths) via the introduction and legislation of the appropriate crosswalk markings and signs to allow this
- Rule 3 (Allowing cyclists to use a left turning lane while riding straight ahead) should be implemented universally across New Zealand via a change to the Road User Rule, and the introduction of suitable exception signs
- Rule 4 (Allowing cyclists to undertake slow moving traffic) should be implemented universally across New Zealand via a change to the Road User Rule, probably with some requirements around speed and careful use, and possibly restrictions in relation to passing left-turners
- Rule 5 (Allowing cyclists to lane split when filtering to the front of a queue of traffic) should not be implemented universally across New Zealand via a change to the Road User Rule,
- Rule 6 (Allowing cyclists to turn left and/or ride across the top of a T intersection despite being faced with a red signal) should be implemented initially at limited trial sites in New Zealand via the introduction and legislation of the appropriate signs/markings to allow this

It is recommended that the Transport Agency and the Ministry of Transport make the necessary steps to progress these Rule changes and trial implementations as promptly as possible.

Due to concerns about the implications of some of these rules in high-speed situations, it is strongly recommended that any initial introduction and trialling of these rules should only occur in lower-speed urban areas (i.e. no faster than 60 km/h, and possibly lower for some rules). In addition, RCAs should be strongly encouraged to apply appropriate design and speed management features to higher-risk sites where these rules may be commonly applied.

A common need with all of the proposed changes would be a comprehensive education and promotion campaign to all road users to make them well aware of the new rules (and still existing ones) and their rights and responsibilities under the changed rules. This may also have the beneficial side effect of improving road user behaviour in regards to other interactions involving cyclists as well.

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7.1 Packaging of Rule Implementations

There is some merit in packaging together some of the proposed Rules, given that they have similar effects on road users, or impact on similar parts of the existing legislation. It may also be simpler to undertake public education campaigns on these changes at the same time too.

Suggested groupings for implementation are:

- Rules 1 and 2 together
 - Both are related to give way rules for turning traffic at intersections
 - Addressing cycle paths and footpaths concurrently would help avoid any confusion that may arise at shared paths
- Rules 3 and 4 together
 - Both involve common current practice by riders and would therefore legitimise existing behaviour

- Negligible safety and efficiency effects expected for these two rule changes
- Rule 6, both 6L and 6T
 - Could be implemented by trials initially

7.2 Crash Analysis Coding

It is also recommended that the Transport Agency give some consideration to additional factor codes or other mechanisms to help more easily monitor relevant crashes in CAS and its successors. For example, more precise recording of which lanes (including cycle lanes and separated facilities) vehicles were in at the time of a crash would be helpful to ascertain whether vehicle positioning was a relevant factor (e.g. for Rules 3 and 4). Movement codes like NA/NB (pedestrians crossing) also don't provide any guidance as to the intended direction of the vehicle when colliding with the pedestrian (e.g. a cyclist turning under Rule 6).

7.3 Other Road Rule Initiatives to Consider

This study has also identified other potential changes to the existing Road User and Traffic Control Devices Rules that may make it easier to provide for cycling and walking (we are also aware of current research investigating cycling on footpaths and minimum safe overtaking gaps). We recommend further investigation into the following:

- The use of a flashing amber turn signal to remind turning motorists to give way to pedestrians and cyclists travelling straight through
- Requiring traffic exiting a side road to also give way to pedestrians crossing a main road
- Requiring drivers to give way to a vision-impaired person crossing the road using a white cane or guide dog.
- Allowing cyclists to treat a STOP control as a GIVE WAY, i.e. not have to come to a complete stop
- Allowing cyclists to use a pedestrian Barnes Dance or head-start pedestrian crossing signal phase for proceeding through the intersection

Appendix A. Observation Site: Bealey Avenue / Madras Street intersection, Christchurch

Axel Wilke observed the Bealey / Madras intersection in Christchurch (see Figure A-1) during the evening peak on Wed 2 June 2016. Between 16:27 and 17:10, cyclists were observed travelling east along Bealey Avenue, and those approaching on Madras Street from the south.

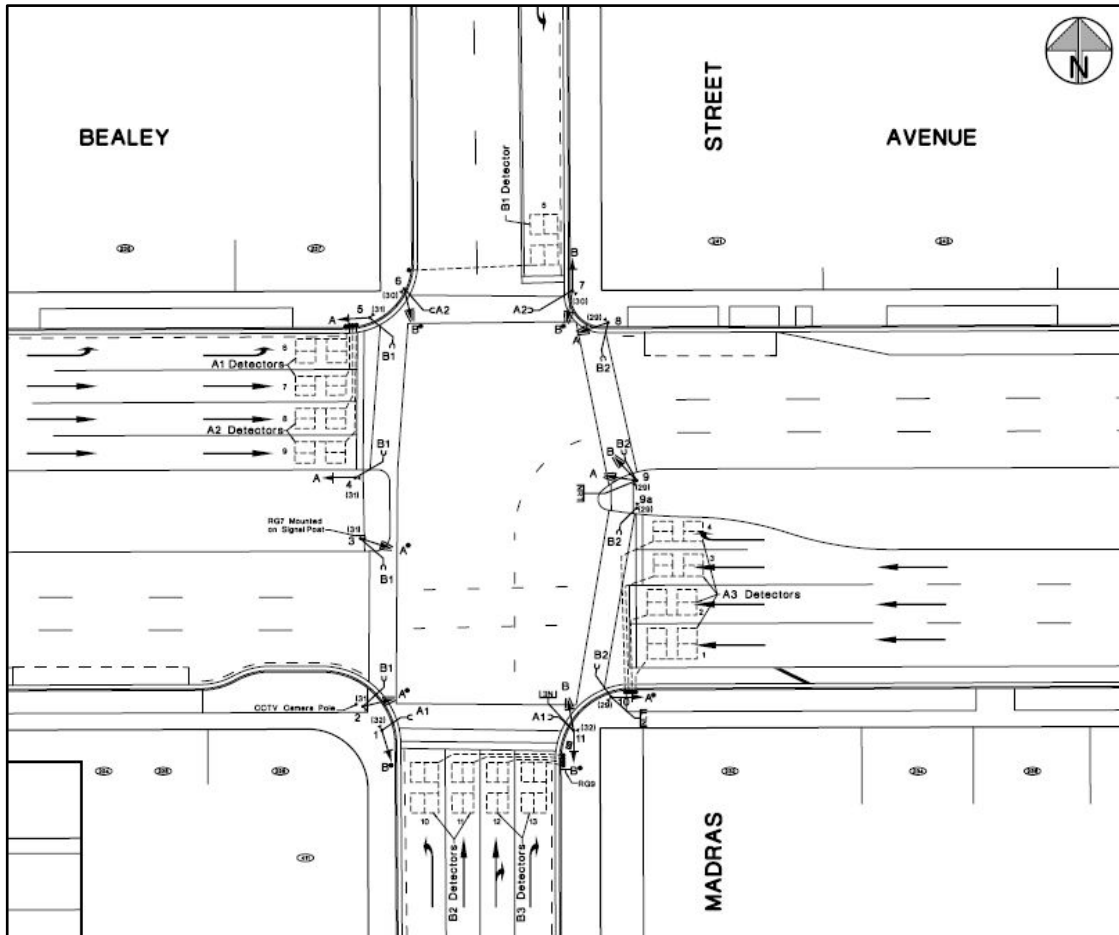


Figure A-1: Bealey / Madras intersection

The Madras Street approach has a very wide exclusive left turning lane, next to a narrow exclusive through lane. Lane 3 is a shared through and right lane, and lane 4 is an exclusive right lane. This lane arrangement makes it difficult for cyclists to turn right in a way that is both safe and legal, and a variety of interesting behavioural responses could be observed.

Figure A-2 describes the various movements observed.

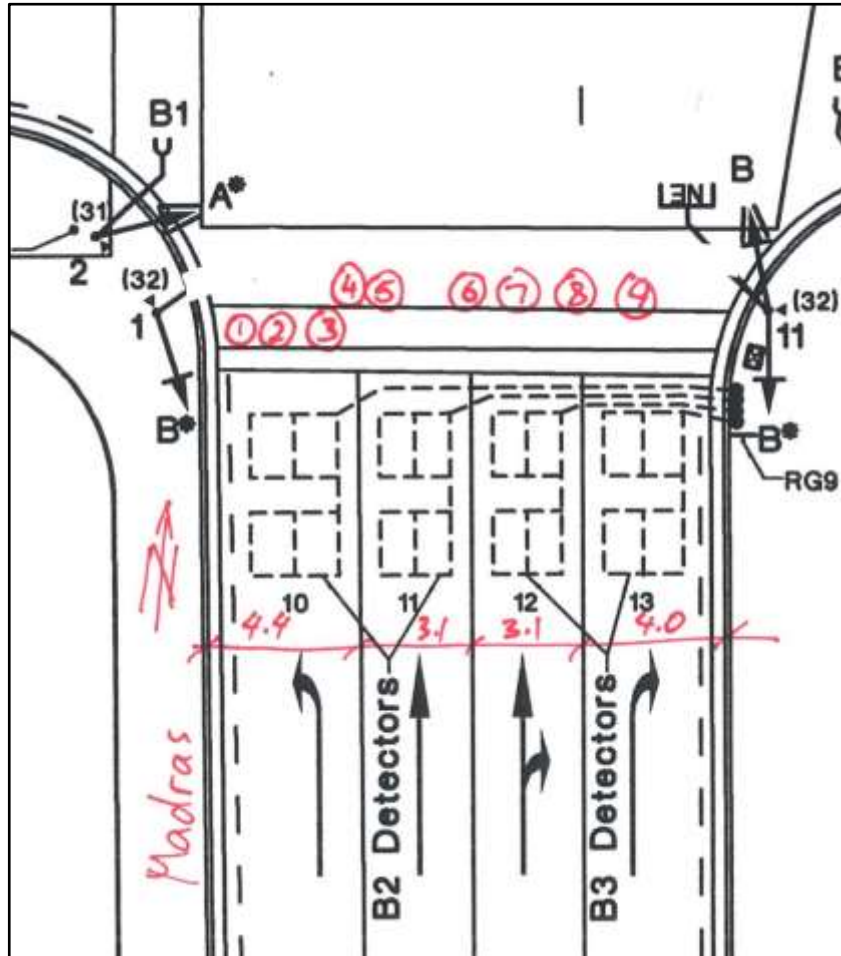


Figure A-2: Madras approach to the intersection

During the observation, 19 cyclists approached the intersection on Madras Street; 2 turned left, 14 went straight through, and 3 turned right. Table A-1 gives the details of their movements:

Table A-1: Observed Madras St cycle movements

time	id	position	movement	notes
16:27	1	3	through	
16:27	2	3	through	
16:31	3	4	through	
16:31	4	8	right	turned right from the lane divider and had other right turners to his left; this looked rather 'interesting'
16:37	5	3	through	
16:40	6	1	left	waited until the signals turned green
16:40	7	9	right	cyclists opted to execute an early start to get away from the adjacent shared lane
16:42	8	3	through	no other traffic around when cyclist arrived
16:43	9	4	through	left turners further back left only a narrow gap to adjacent through lane, which affected cyclist's positioning
16:44	10	2	through	
16:44	11	1	left	during red
16:52	12	1	through	got caught to the left of left turners and fled onto the footpath from where he waited for a gap
16:52	13	3	through	
16:55	14	3	through	
17:03	15	3	through	
17:05	16	6	through	
17:06	17	3	through	
17:08	18	4	through	left turners further back left only a narrow gap to adjacent through lane, which affected cyclist's positioning
17:10	19	1	right	interesting way to turn right; see text

Of the left turners, both arrived when the signals were red, and one of them waited for a change to green, while the other proceeded on the red signal. The majority of through cyclists proceeded from position 3 (8 of 14), with the second most common from position 4 (3 of 14), which was generally caused by left turners leaving only a narrow gap to the adjacent through traffic. Only one cyclist proceeded straight ahead from one of the through lanes, but that that person was clearly confused, as he had positioned himself in position 6 (i.e. in between the two through lanes) while there was no other traffic around. Upon realising his mistake and before the next platoon arrived, he corrected to the normal position on the left (in line with position 3) while entering the intersection.

The shared through and right lane makes turning right very challenging, and users had a variety of responses, ranging from starting from position 8 with other right turners to his left, starting from position 9 but opting for a head start, to a near-side hook turn from position 1 that involved the usage of two of the pedestrian crosswalks.

The Bealey Avenue approach is shown in Figure A-3. The cross section on Bealey Avenue is much tighter than Madras Street, and dense traffic forces cyclists to travel too close to parked vehicles than is safe, as cycling in the door opening zone is required. There were 10 cyclists observed travelling east along Bealey Avenue during the observation period; seven on the carriageway, and three on the footpath on the south side. The following diagram is used to describe the various movements observed on the carriageway.

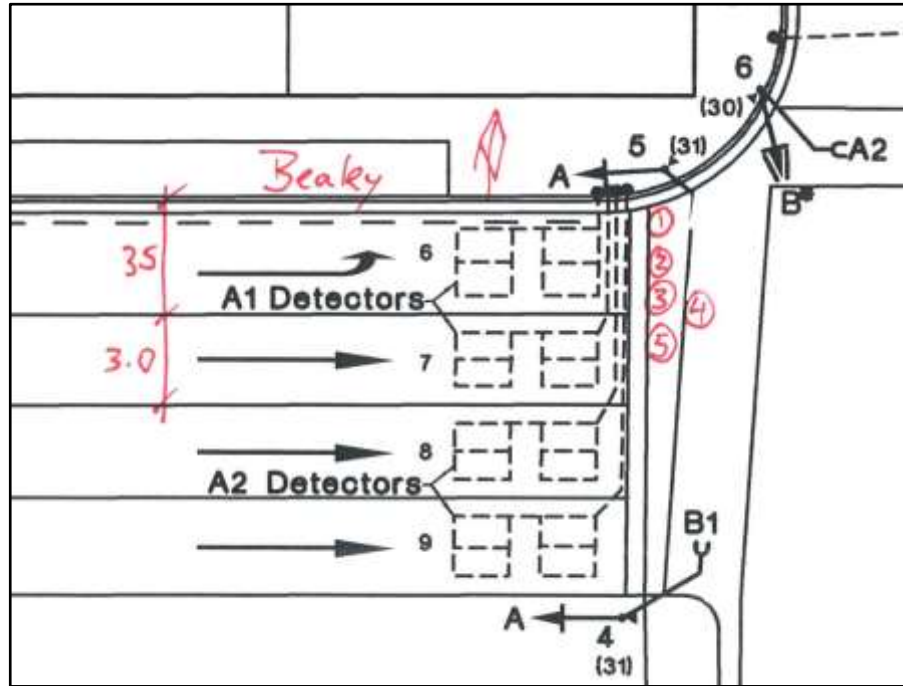


Figure A-3: Bealey approach to the intersection

One cyclist turned left, while six cyclists proceeded straight through, while nobody turned right (not a permitted movement anyway). Table A-2 gives the details of their movements:

Table A-2: Observed Bealey Ave cycle movements

time	id	position	movement	notes
16:35	20	2	through	
16:39	21	10	f/p	going east on south crosswalk
16:39	22	10	f/p	going east on south crosswalk
16:45	23	2	through	
16:48	24	1	left	
16:55	25	1	through	
17:01	26	10	f/p	going east on south crosswalk
17:03	27	3	through	
17:05	28	3	through	
17:10	29	4	through	

Through movements were undertaken from position 2 (2 off), 3 (2 off), and 4 (1 off). The person who proceeded from position 4 arrived at the intersection after the left turn lane was already occupied by vehicles, and he opted to go to the limit line by lane splitting. None of the cyclists attempted to proceed straight ahead from position 5 (i.e. the 'legal' position).

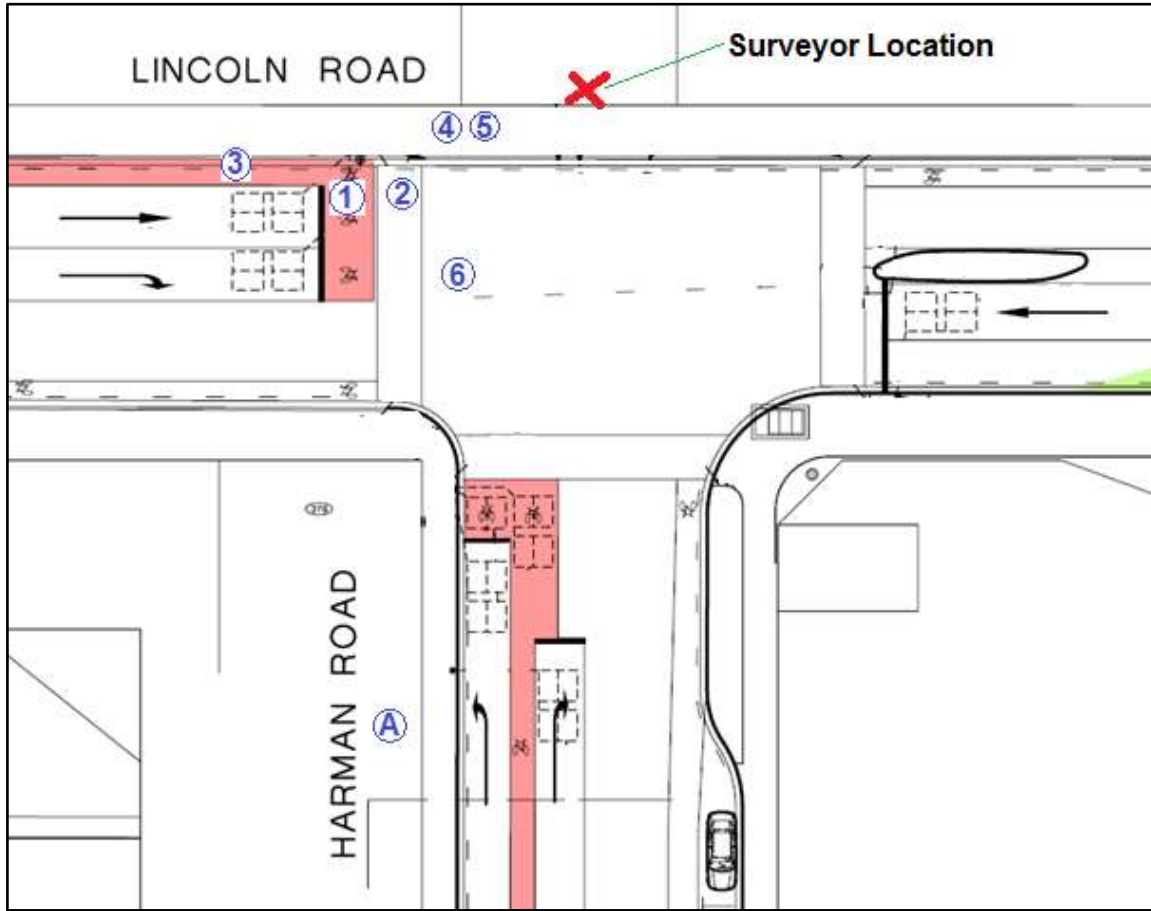


Figure B-2: Lincoln Road / Harman Street intersection cyclist movements

Table B-1 Table B-1 shows the 43 cyclists and thereafter number of which who ran a red signal.

Table B-1: Locations of cyclists at Lincoln / Harman intersection

Position	Description	Cyclist Count	Plus those who ran a red signal?
1	Stopped on a red signal and waiting	2	1
2	Waiting and creeping while not clicking out of pedals	1	-
3	Slowed down as not to click out of pedals	2	-
4	Using footpath to pass intersection on a green signal	2	-
5	Transitioned onto footpath to pass intersection on a red signal, then dropped back down once past intersection	-	2
6	Waiting to perform filter turn	1	-
7	Passed through on a green	32	-
TOTAL		40	3
A	Passed through Burger King car park to turn left on a red signal	1	

In all three cases where cyclists ran a red signal at this intersection, it was to ride across the top of the T-intersection. One of the cyclists was initially waiting in Position 1, but then grew impatient and took off before the signal changed to green. The two other 'illegal' cyclists were initially using the Lincoln Road cycle lane and as the signal turned red on their approach, they popped the kerb and used the footpath to get through the intersection (Position 5), assumedly to get out of harm's way from turning vehicles from Harman Street, or thought that they were not breaking the road rules. These cyclists then proceeded to use the drop down kerb for the pedestrian crossing (right one in Figure XYZ) to enter back into the cycle lane. Two other cyclists were using footpath consistently as they approached, passed through and left the intersection, which is not allowed.

As the surveyor was leaving the site, they did notice one cyclist approaching on Harman Street who used the adjacent Burger King car park to continue their commute unobstructed by the red signal. Strictly speaking this is not breaking the red signal and is shown by Position A on Figure B-2.

Appendix C. Observation Site: Riccarton Road / Straven Road / Clarence Street, Christchurch

Shaun Boshier observed movements at this intersection on the morning (07:50 - 08:20) of Tue 7 June 2016. This intersection was selected in order to try and observe cyclist habits for Rules 3, 5 and 6 (left-turn on red signal), during the AM peak period. The three rules that were hoped to observe;

- Cyclists using an exclusive left-turn lane as a through lane
- Cyclists approaching the limit line in between two rows of vehicles, stopped at the line or slow moving
- Cyclists turning left on a red signal

The intersection runs on a five phase signal cycle, with what appeared to be a fairly even distribution of phase time for the east-west and north-south flows.

The intersection is relatively well appointed with cycle lanes, with exit lanes in each direction but only approach lanes in the north-south direction. Riccarton Road does not have approach cycle lanes in either direction, as shown by the intersection diagram (Figure C-1). There are no advanced boxes present for cyclists to utilise when the signals are red.

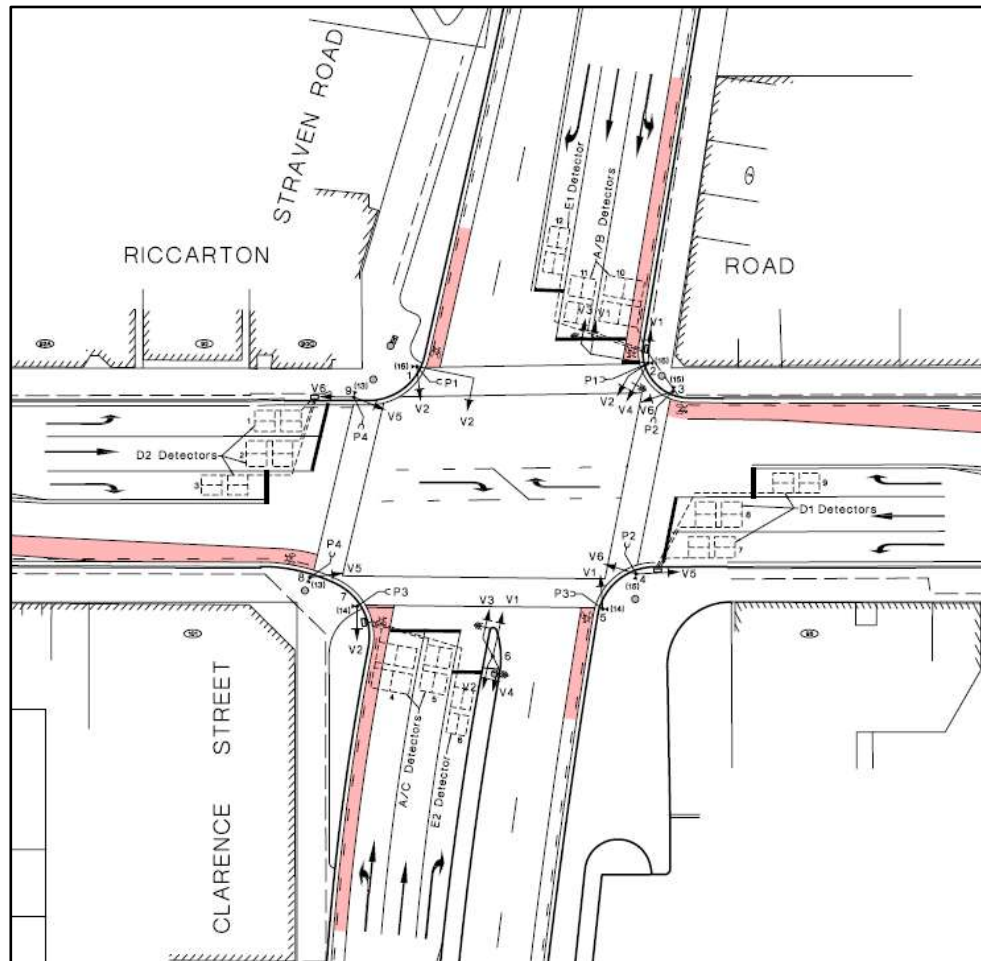


Figure C-1: Riccarton Road / Clarence Street / Straven Road intersection

During the half hour observation period, there was a limited number of cyclists commuting towards the city and the south. Again the freezing temperatures of a June morning may reduce cycle numbers. In all there were 32 cyclists counted. The surveyor was located in the NE corner of the intersection and focused on three approaches, excluding the Clarence Street cyclists heading north or west.

Amongst the 32 cyclists there were some road rule breakers. Again there were no cyclists observed turning left on a red signal (actually no left-turn cyclists were observed).

Figure C-2 shows the locations of the cyclists that passed through the intersection.

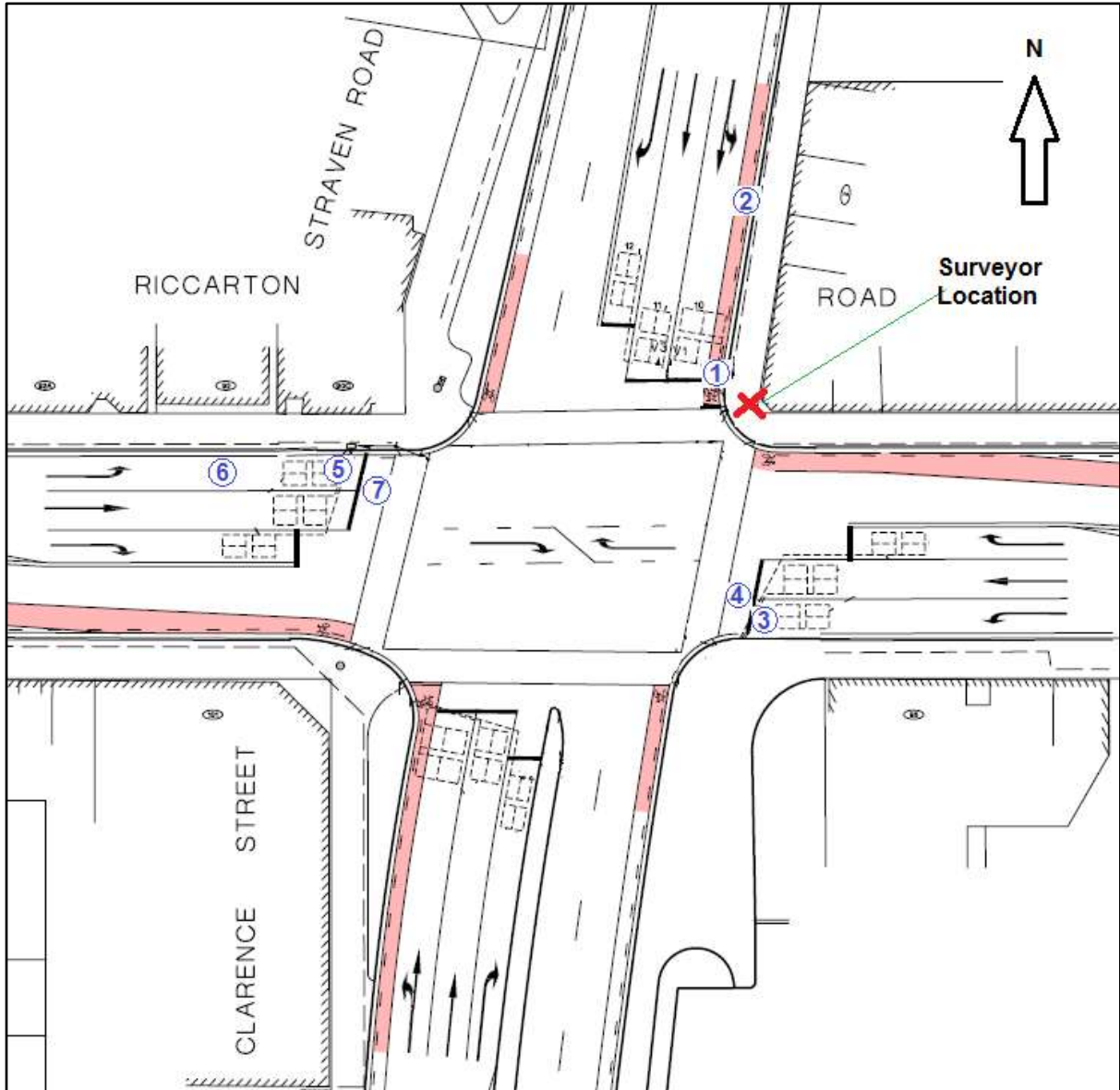


Figure C-2: Riccarton Road / Clarence Street / Straven Road intersection cyclist movements

Table C-1 outlines how the 32 cyclists moved through the intersection and separates out those instances when left-turning vehicles gave way to cyclists in the cycle lane who pedalled straight through the intersection.

Table C-1: Locations of cyclists at intersection

Position	Description	Cyclist Count	Left-turn vehicle give way?
1	Stopped on a red signal and waiting to go straight	7	1
2	Cyclist approaching at start of a green signal, stationary vehicle gave way to cyclist	-	1
-	Cyclists through on green signal to Clarence Street	5	-
3	Cyclist waiting in LT lane on red, then straight through	2	-
4	Cyclist waiting in front of vehicles on red, in between the two lanes	1	-
-	Cyclist straight through in LT lane on Riccarton Road (east approach) on green signal	1	-
5	Cyclist waiting in LT lane on red, then straight through	8	-
6	Cyclist waiting behind a vehicle on a red signal	1	-
7	Cyclist waiting in front of vehicles on red, in between the two lanes	1	-
-	Cyclist straight through in LT lane on Riccarton Road (west approach) on green signal	4	-
TOTAL		30	2

There were two occasions where the left turning vehicles on Straven Road gave way to cyclists in the cycle lane. The first was a cyclist waiting at the limit line after a red signal and the other was a cyclist approaching the limit line on green signal and the left-turn vehicle waited for the cyclist to pass through on the inside.

Of the four cyclists travelling westbound on Riccarton Road, two travelled straight through using the left-turn lane on a green signal and one other did the same after waiting at a red signal. There were 14 cyclists heading eastbound to the city on Riccarton Road. Of these, four travelled straight through using the left-turn lane on a green signal, while nine did the same after waiting at a red signal. One of the nine waited behind a car who was positioned at the limit line to turn left. Figures C-3 & C-4 show the cyclists using the left-turn lane as a through lane, either on a red or green signal.



Figure C-3: Cyclists waiting in left-turn lane on a red signal, who then continued straight ahead



Figure C-4: Cyclist using left-turn lane as a through lane on green signal

Only two cyclists were observed to wait for a green signal at the correct location on the limit line. Figure C-5 shows cyclists waiting at locations 4 and 7 (from Figure C-2), where they wait straddled between the through lane and left-turn lane.



Figure C-5: Cyclists waiting at limit line, but located in between the left-turn and through lanes

Rule 4 (Overtaking on left-hand side)

In addition to surveying the Riccarton Road intersection, the surveyor walked 200 m westbound along Riccarton Road to observe if any cyclists were undertaking slow moving vehicles, when no cycle lane was present (Rule 4). This is currently not a permissible movement for any vehicle in the NZ road code. Over a ten-minute period, the surveyor observed two occasions where a cyclist was undertaking slow-moving traffic, without either the cyclist or any adjacent motorists appearing to be concerned by such a

movement. Other cyclists observed were moving slower than the traffic (e.g. when there was a green traffic signal). See figure C-6, which shows the two occasions of undertaking observed.



Figure C-6: Cyclists undertaking slow moving vehicles on Riccarton Road

Appendix D. Observation Site: Brougham Street (SH6) / Antigua Street / Strickland Street, Christchurch

Shaun Boshier observed movements at this intersection on the morning (07:50 - 08:30) of Wed 8 June 2016. This intersection was selected in order to try and observe road user habits for Rules 1, 3 and 6 (left-turn on red signal), during the AM peak period. The three rules that were hoped to observe;

- Whether vehicle drivers who were indicating to turn left, would wait for through cyclists either stopped at a red signal or moving through the intersection on a green signal.
- Cyclists using an exclusive left-turn lane as a through lane.
- Cyclists turning left on a red signal.

The intersection runs on a two phase signal cycle, which understandably favoured the higher volume SH76 traffic commuting in the east-west direction.

The intersection is very well appointed with cycle lanes in the north-south direction, with approach and exit cycle lanes in each direction. The approach lanes in the north-south direction do include two or three fixed flexible plastic bollard posts, which help to keep separation between cyclists and vehicles, as well as acting as a subtle reminder cue for left-turn vehicle drivers to look out for cyclists on their inside before they turn. On SH76 there are short cycle lanes on the approaches of approximately 70 m in length and both run in between the left-turn lane the left-hand through lane, as shown in Figure D-1. The limit line of each cycle lane is such that each is slightly advanced of the limit lines for vehicles, but none of the legs of the intersection provide any advanced boxes for cyclists to utilise when the signals are red.



Figure D-1: Brougham Street (SH6) / Antigua Street / Strickland Street intersection

During the 40-minute observation period, the route proved to be quite popular, in particular with cyclists heading from Strickland Street to Antigua Street (and onwards into the city). Once again the survey was conducted on a frosty but clear morning, so one could expect that cycle number might be higher at times of warmer weather. In all 104 cyclists were counted using the intersection.

The surveyor was located in the SE corner of the intersection and focused primarily on the Strickland Street approach, but trying to capture all other movements as well. On two occasions there were seven cyclists stacked on the Strickland Street approach, waiting at a red signal. On one other occasion there was six cyclists, so this highlights the demand on this route.

This was a good location to observe how road users interact around Rule 1, while there were some cyclists who broke Rule 3 as well. Interestingly there was also a Rule 5 breaker observed, who cycled in between the waiting vehicles on Strickland Street, in order to position themselves to the front of the queue, so they could perform a filter right-turn when the signals turned green. This position is denoted by number 11 on Figure D-2, as well as all other movements observed.

There were no cyclists observed turning left on a red signal, this was due to no left-turn cyclists being observed during the survey period.

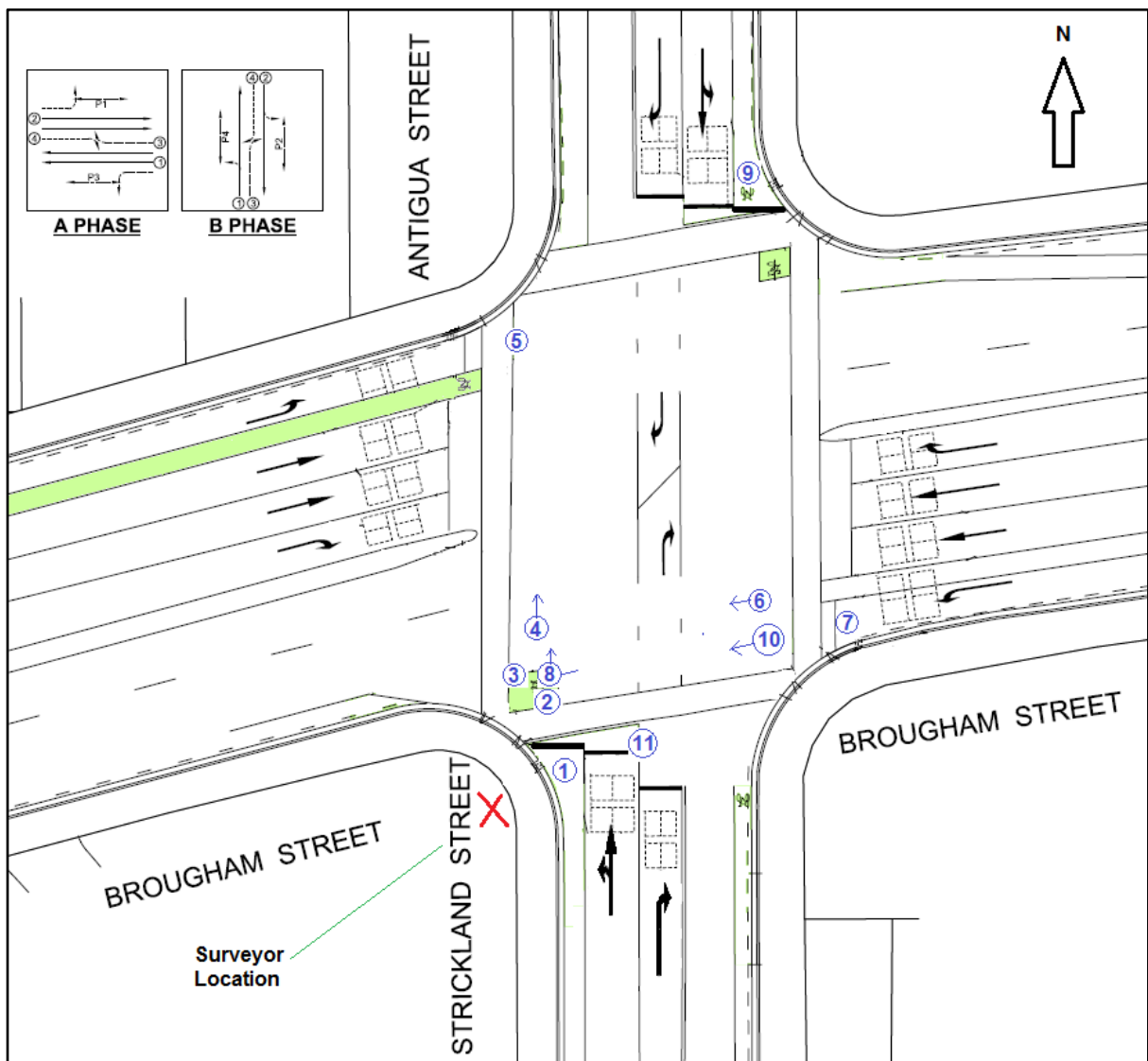


Figure D-2: Brougham Street (SH6) / Antigua Street / Strickland Street intersection cyclist movements

Table D-1 outlines how the 104 cyclists recorded, moved through the intersection and separates out those instances when left-turning vehicles gave way (or not) to cyclists in the cycle lane, who pedalled straight through the intersection.

Table D-1: Locations of cyclists at intersection

Position	Description	Cyclist Count	Left-turn vehicle give way?
1	Cyclists waiting at red signal to travel through intersection	47	Yes: 3
2	Strickland cyclists waiting at red signal ahead of vehicles in the hook turn box, to travel through the intersection.	13	-
3	Cyclist who waited at red signal, only to be cut-off by left-turn vehicle	1	No: 1
4	Cyclists travelled through intersection on a green signal	25	Yes: 2
5	Eastbound cyclist waiting ahead of left-turn lane on red signal	2	-
6	Westbound cyclist using the cycle lane on green signal	4	-
7	Westbound cyclist waiting in left-turn lane on red signal	1	-
8	Westbound cyclist who used the hook turn to head north on Antigua	1	-
9	Southbound cyclist waiting in cycle lane on red signal	2	-
10	Westbound cyclist travelling in left-turn lane on green signal	1	-
11	Right-turn cyclist from Strickland who cycled to front of limit line in between the queue of waiting vehicles	1	-
TOTAL		98	6

There were five occasions where the left turning vehicles on Strickland Street gave way to cyclists in the cycle lane and one occasion when the left-turn vehicle cut-off a cyclist. Of the five vehicles which gave way to cyclists, three occasions were at the start of a green signal and the other two occasions were whilst the green signal had been in operation for a period of time.

There was the one occasion when a cyclist was cut-off by a left-turning van. The cyclist had advanced from Position 1 and was just ahead of the hook-turn box, before they were cut-off (Position 3). The van driver must have noticed the cyclist too late, as they came to a stop. However, by that point the nose of the van was in front of the cyclist, so they decided to continue in front of the cyclist. The surveyor was

not able to witness the reaction of the driver, but the cyclist was not overly upset. This may have perhaps been due to the fact they appeared to be a younger person of perhaps high school age.

It must be noted that actual number of cyclists using the intersection during the survey was higher than 104. Initially the surveyor did not count those northbound cyclists on Strickland Street, who were travelling through the intersection on a green signal (using the cycle lane). The initial focus of the survey was on the location, movements and interactions of cyclists who were waiting at a red signal. The reason the surveyor started to count the through cyclists (about halfway through the survey), was due to noticing that a number of cyclists were not looking over their right shoulder to confirm whether any vehicles coming from behind them, were going to make a left-turn movement. Therefore, assuming that their precedence (as a through movement) was going to be adhered to by the left-turn motorists. Table D-2 shows a breakdown of the 27 cyclists who were counted and their traffic awareness.

Table D-2: Behaviours of cyclists at intersection

Description	Cyclist Count
Cyclists pedalling through and checking for turning traffic behind them before approaching the limit line	7
Cyclists pedalling through and not checking for turning traffic behind them before approaching the limit line	16
Cyclists who didn't look over shoulder but may have been able to confirm vehicle movements by indicators as the cyclist passed them in the queue (vehicles slower moving)	2
TOTAL	27

Whilst there were no near misses and in general vehicle drivers' appeared to be on the lookout for cyclists, it did strike the surveyor as being somewhat of a cavalier attitude by cyclists to expect that their safety was assured. Not to mention any of those cyclists who were using headphones and did not look. It must be said that perhaps some of the 16 cyclists who were observed not to look over their right shoulder, may have indeed made an earlier decision than the surveyor was able to witness.

The surveyor did not notice any frustration from vehicle drivers when the one cyclist (who broke Rule 5) cycled between the two rows of queued traffic in order to turn right onto SH6. This would seem to suggest that either most people were not aware of the road rule, or if they are aware, that they are not concerned when a cyclist breaks the rule. This same rule is one that is sometimes broken by those road users on motorcycles, mopeds or scooters as well.