



## **Making traffic signals work for people cycling**

*New Plymouth Transport Choices*

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Kia ora koutou, my name is Axel and the title of my presentation is **Making traffic signals work for people cycling**

The background work was undertaken for the New Plymouth Transport Choices project and apart from me, Megan Gregory from the ViaStrada team had most to do with the traffic signal design.

## Paint vs concrete



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When people cycling are provided for on the road at traffic signals, their space might be designated by paint.

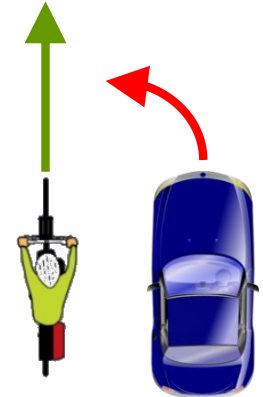
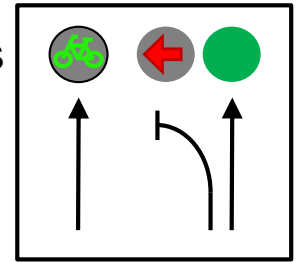
Or we can dedicate physically separated space, for example by using a concrete separator.

It is desirable to achieve physical separation between drivers and people cycling. This talk is about why this makes a difference for how traffic signals must

be operated, and that this operation is often not beneficial for people cycling. Hence, I would like to present a concept that provides the physical separation without having the negative operational consequences.

## Setting the scene

- Separated cycleways at signalised intersections
  - left turning motorists vs through cyclists
- Typical treatment = “fully protected”
  - Is this *really* the safest option?
  - What else could we do?
- Let’s talk...



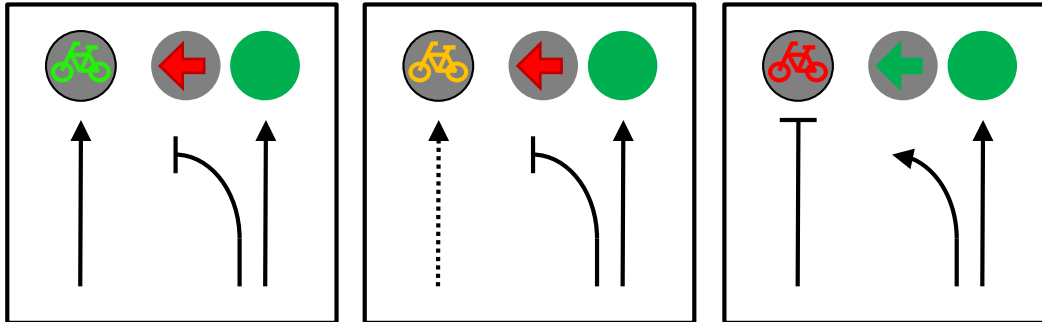
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What the legislation requires us to do is to “fully protect” the cycle movement from turning motorists. I will explain on the next slide what exactly that is.

Meanwhile, I’ll ask the high-level questions whether this really has the safest outcomes for people cycling.

Let’s talk this through.

## Fully protected cycleway at intersection



- Opposite to “full protection” is “filter turning”
  - the normal give way rules apply



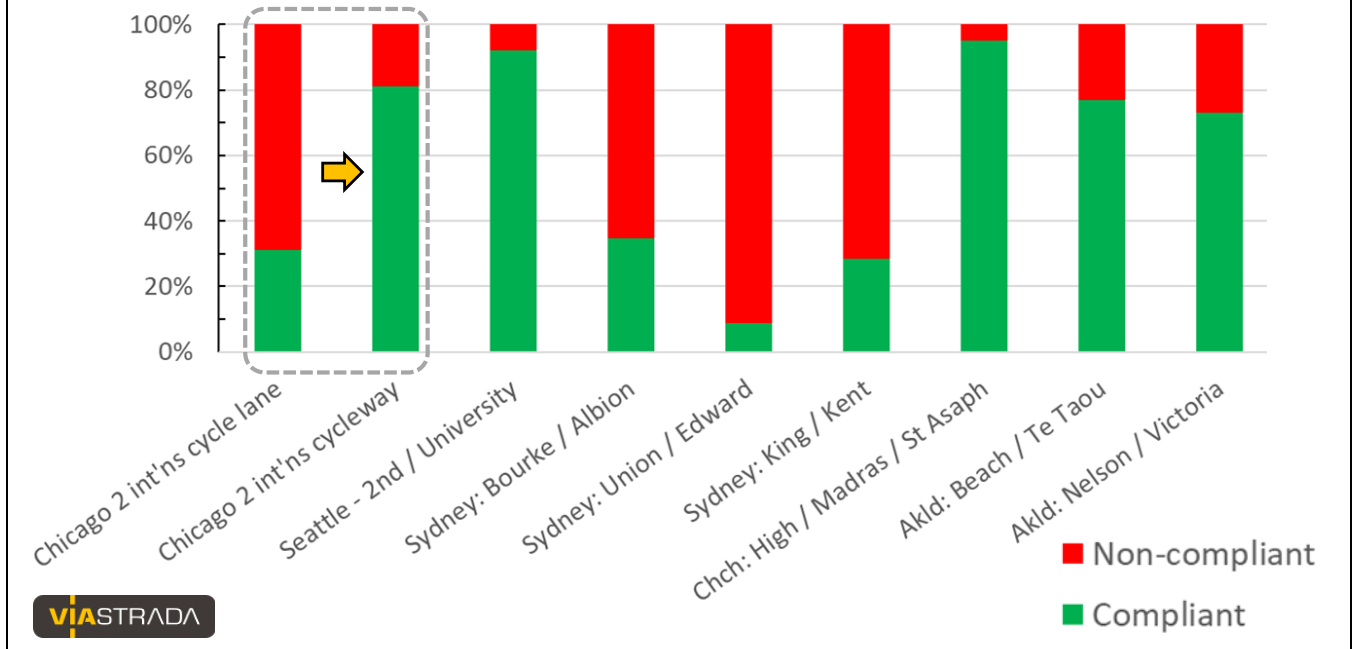
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With full protection, either people cycling have a green light and turning drivers are on a red arrow, or the colours the other way round.

The opposite to “full protection” is filter turning, when drivers turn by applying the give way rules. That is, when turning, drivers give way to traffic going straight – including people cycling. Drivers also give way to pedestrians on a crosswalk.

Let's look at how full protection is working...

## Cycle compliance studies – full protection



Here's an overview of traffic lights at sites with full protection where cyclist compliance with the traffic lights has been studied. Each bar is one site. The green part is the proportion of cyclists going through the intersection when their traffic light is green. The red portion represents those who don't comply with the lights. As you can see, different sites have very different compliance rates. But apart from one site studied, every site has non-

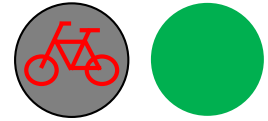
compliance that is WAY too high.

Whatever it is that is going on, something is clearly not working out as intended.



## Factors in cyclist compliance at full protection

- Opportunity to infringe
  - Depends on proportion of people cycling arriving at the lights when it is red
- Risk of conflict
- Comparison with parallel through traffic



$$\text{Cyclist compliance} \sim \frac{\text{cyclist green time}}{\text{parallel traffic green time}}$$

$$\text{Cyclist compliance} \sim \frac{1}{\text{cyclist crashes}}$$

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Alrutz et al (1996)

There are many reasons why people may not comply with the traffic lights that I don't have time to discuss. One important aspect that we do need to consider is the length of green time that cyclists get compared to parallel drivers.

The leading German researcher in this topic area once studied this and found that cyclist compliance is related to the ratio of their green time to the green time of parallel car traffic. The less green time

you give to cyclists, the lower their rate of compliance.

He also found that compliance by cyclists is inversely proportional to their number of crashes. The less compliance there is, the more crashes cyclists had.

This is a key finding. Full protection reduces the green time that cyclists get compared to parallel through traffic, and this study shows us that it will result in cyclists experiences more crashes. That's the exact opposite from what you would expect full protection at traffic signals would achieve.

## Legal situation

- Road User Rule (RUR)
  - establishes the rules under which traffic operates on roads
  - Ambiguous definition of “roadway”
- Accessible Streets Package was to address those issues
  - Consulted on in early 2020
  - Was supposed to be enacted during 2020/21



I won't get into the intricacies of the legal situation, but the problems arise from how “roadway” is defined in the road user rule. If you are travelling on the roadway, different rules apply.

Which results in users of a protected cycleway needing their own traffic lights and signal phases. The problems have become more visible over the last few years as we've built more protected cycleways. The legal issue was supposed

to be fixed through a legislative amendment consulted on in early 2020, but the whole legal package has disappeared without trace somewhere between the minister's desk and a cabinet meeting.

## If legal implications weren't an issue...

- Other jurisdictions that allow filter turning do so for up to 150 cars per hour
  - That's a busy turn and whether it's the right number should be studied / observed
- In New Zealand, we do allow filter turning when it's a cycle lane
  - What is the real difference between paint and concrete as separators when it comes to filter turning?

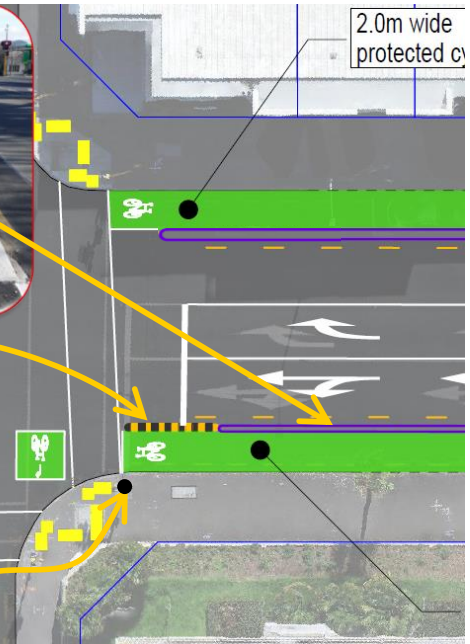
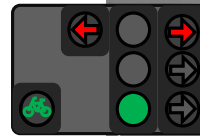


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What is done in other countries? In most places, they allow filter turns for up to 150 vehicles per hour, which is quite a bit and whether that's the right number for NZ is something that should really be studied. In NZ, we always allow filter turning when it's a painted cycle facility.

## New Plymouth proposal: layout

- Cycleway with physical separators (concrete)
- 5 m before limit line use commercial speed hump in lieu of separator
  - Cycleway now forms part of the roadway

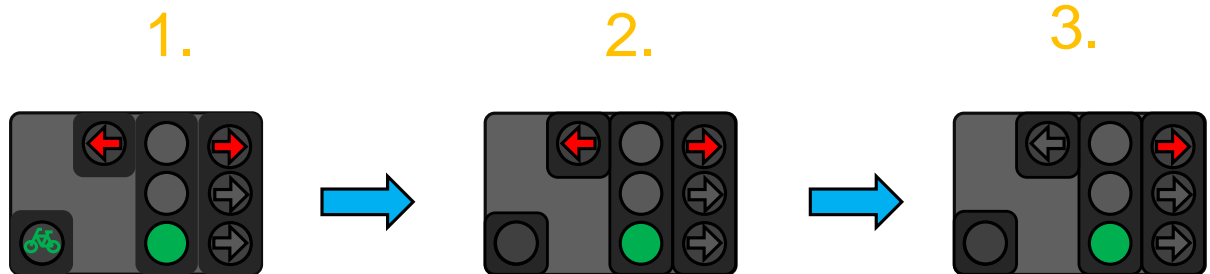


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The way we want to lay out the traffic signals in New Plymouth is to have physically protected cycleways. Just prior to the intersection, we stop the concrete separator and use a commercial speed hump instead. That allows us to argue that the cycleway, at the traffic lights, forms part of the roadway. And it's thus up to us to decide how to operate the traffic lights, rather than legislation prescribing something.

## New Plymouth proposal: operation

1. Green cycle signal / red arrow for initial period of protection
2. Extinguish cycle signal (transition period 2–5 sec)
3. Turn off the left turn red arrow and allow 'filtering'



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At the beginning of a traffic phase, we want to show a green cycle signal and a red arrow for turning traffic.

After some time, we would extinguish the green cycle signals.

And after some further time, we would extinguish the red arrow. Turning drivers can now filter turn through parallel pedestrians and cyclists.

## Expected outcome

- Expected to function like filter turning through a (painted) cycle lane
  - Operationally more efficient for people cycling and driving
  - Cyclists can go whenever parallel drivers have a green light
- Expected to have much better compliance with traffic lights
- Expected to have improved safety outcomes
  - Because of the relationship between non-compliance and crashes

We expect this to work just like drivers filtering through a cycle lane. Well, a bit better because we initially show a red arrow to turning drivers. This is a more efficient way of operating traffic signals, not just for cyclists but also for drivers. Importantly, cyclists can move whenever parallel drivers going straight ahead have a green light.

We therefore expect cyclists to have very good compliance with the traffic lights.



And due to the relationship between cyclist non-compliance and them experiencing crashes, we expect this to be the safest way that traffic lights can be operated.

## Next steps

- New Plymouth construction uncertain due to government's funding withdrawal for Transport Choices
  - NPDC did receive \$3.85m for construction before that change but what will be built has not been decided
- Other councils interested in trying out this concept
  - Hamilton City Council – commitment
  - Tauranga City Council – commitment
  - Christchurch City Council – investigation
- Will gain experience from those sites



What's going to happen from here? In New Plymouth, whilst there is some uncertainty through government having withdrawn funding for Transport Choices projects, the council did secure a good amount of construction funding before that change came into effect. Hence, something will be built there.

I presented this concept at the last conference where traffic signal geeks come together, and Hamilton and

Tauranga have already made commitments to implement this system at some sites, whilst Christchurch is currently investigating the most suitable sites for this operation.

And from all those site, we will gain a lot of experience.

# Thank you!

## Questions and discussions



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Thank you for listening and sorry for racing through this; there's a lot more to it. If you want to follow up, feel free to contact Megan or me at ViaStrada, or talk to Liz Beck at New Plymouth District.