



Left turn treatments at signalised intersections

Safety review

Megan Gregory & Axel Downard-Wilke
SNUG workshop | September 2026

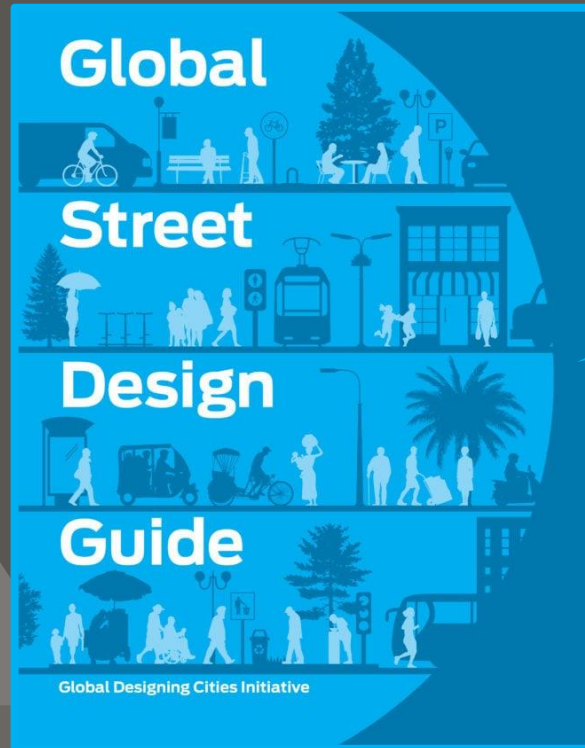


Left turn treatments at signalised intersections

A.k.a. slip lanes aren't as
bad as some people think

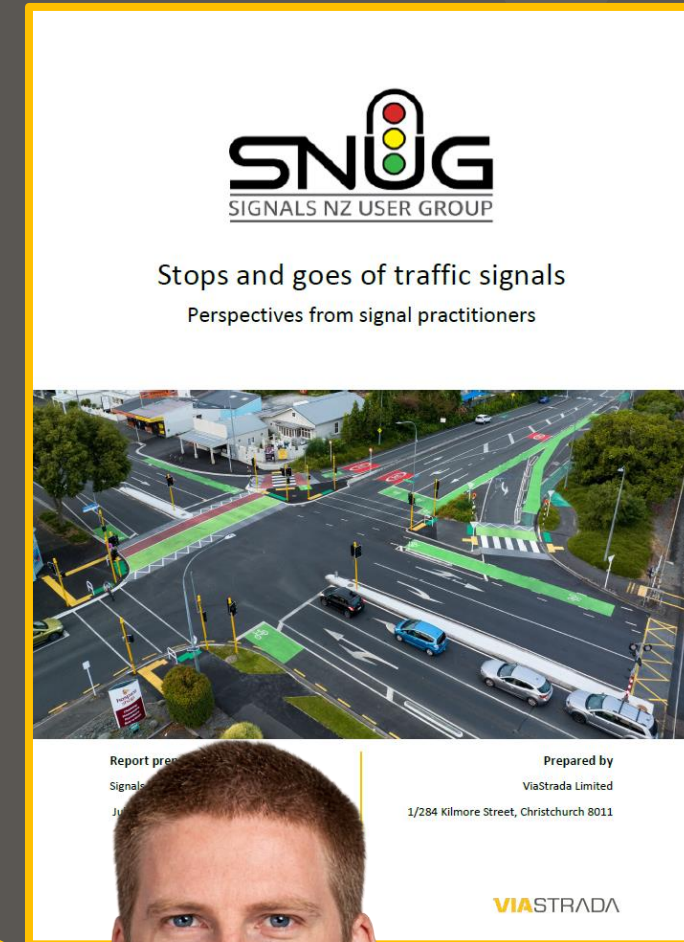
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What's the big deal?

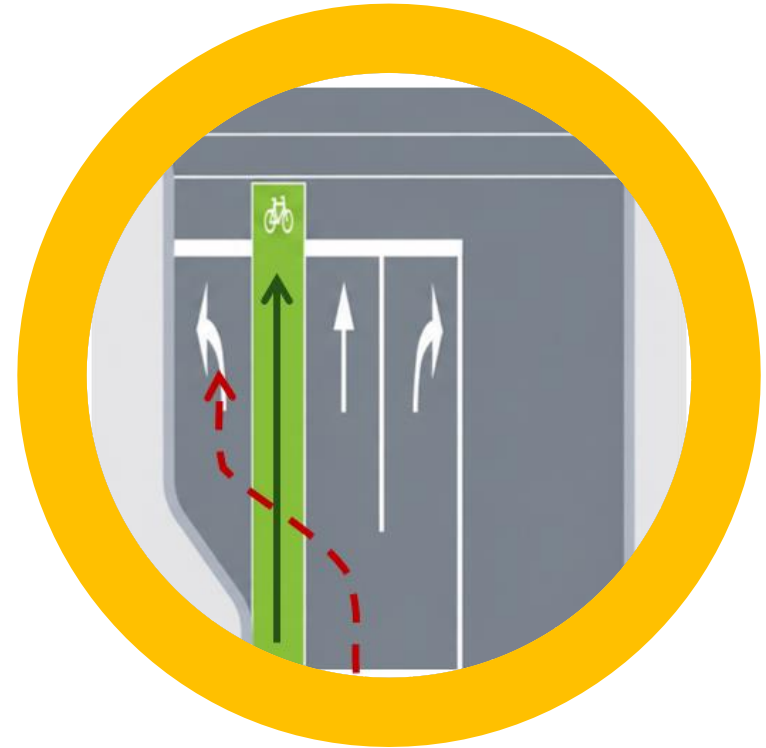


Remove slip lanes where possible...
...more **compact** intersections...
...reduce pedestrian exposure,
slow traffic near conflict points,
and increase visibility for all users.

Well-designed slip lanes...
...can **improve pedestrian safety**
...and reduce pedestrian delay!

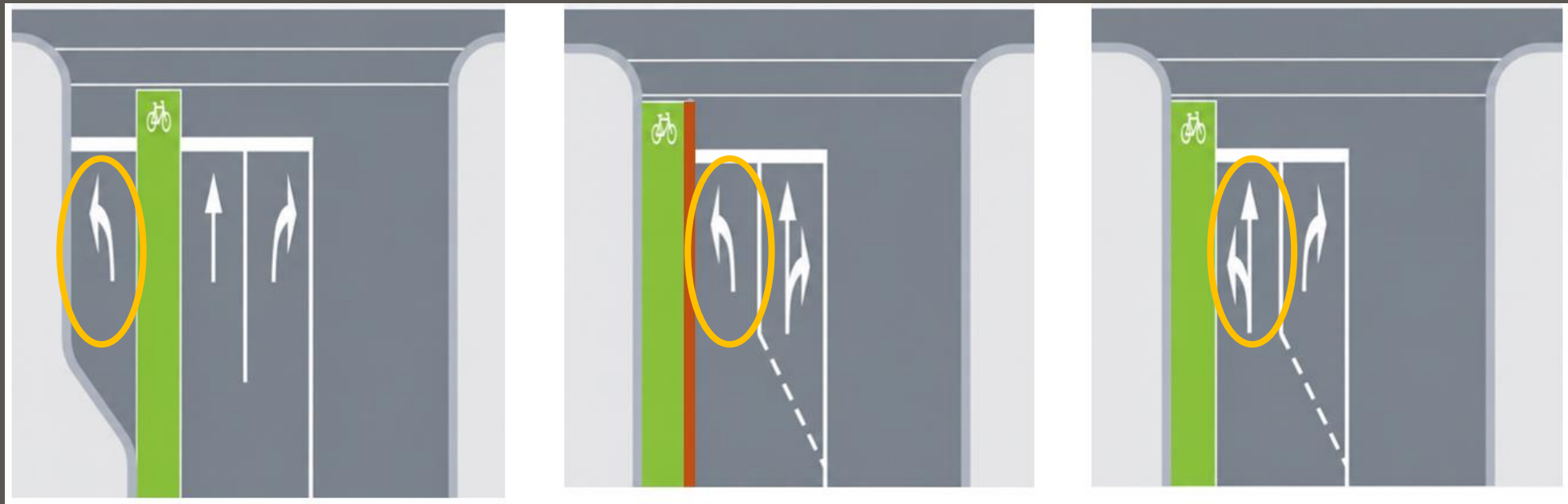


Treatments considered



Left turns within the signalised intersection

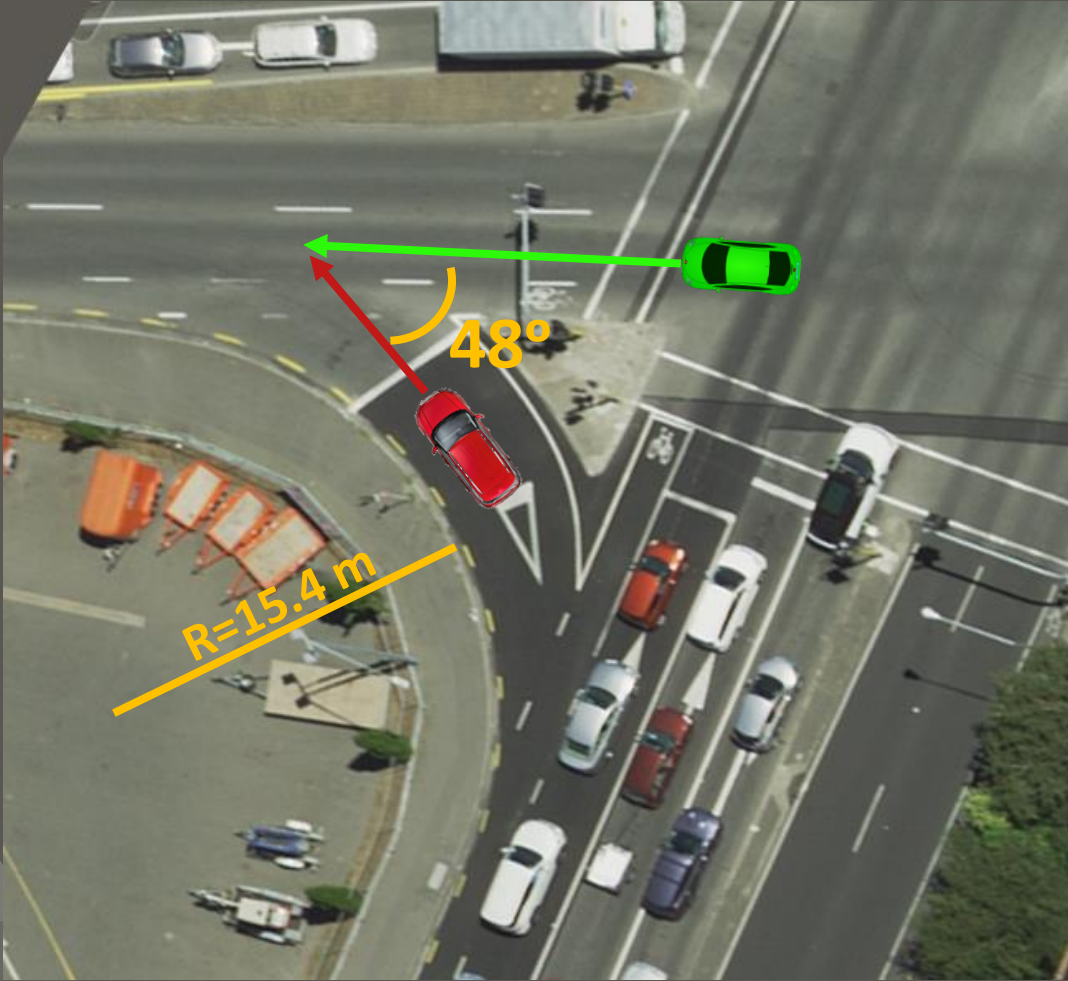
- “Conventional left turns”



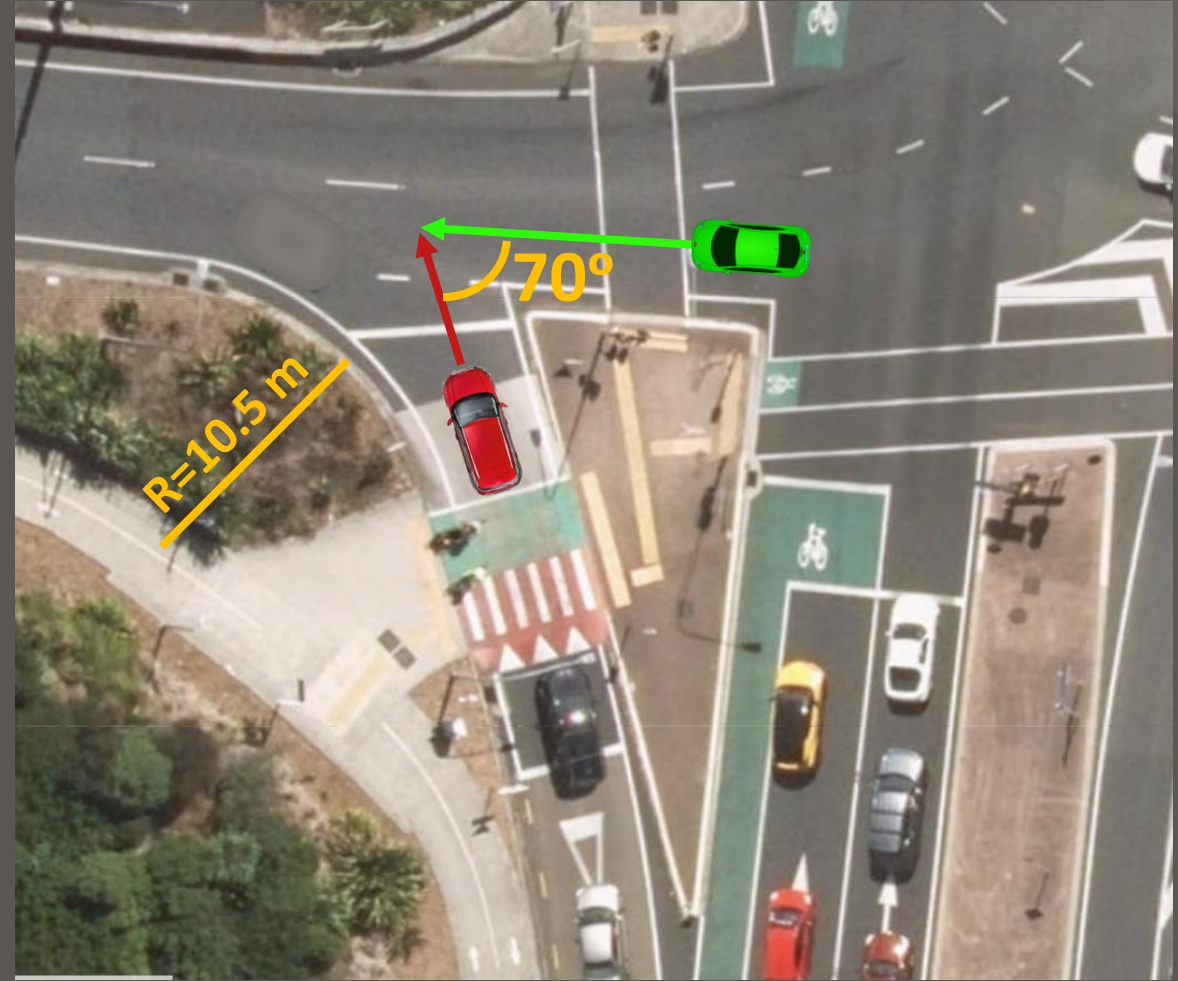
Exclusive left turn lane

Shared left turn /
through lane

Slip lanes – entry angle

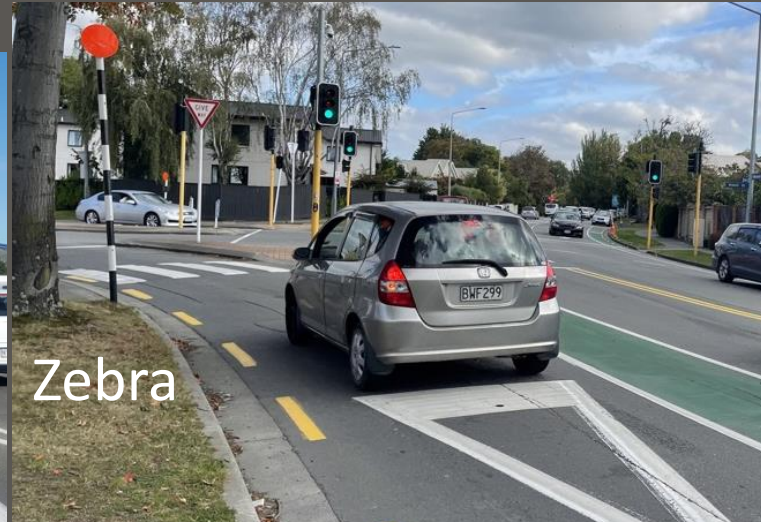


Low entry angle ($<70^\circ$)
Radius $> 15\text{ m}$

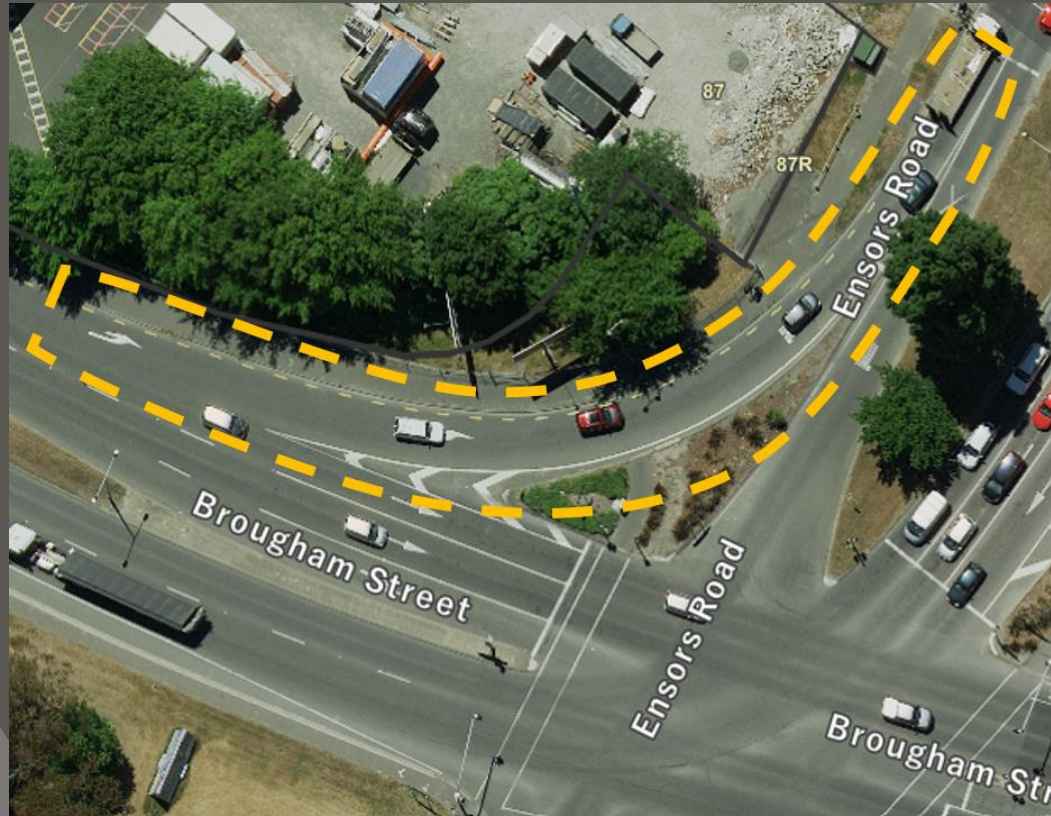


High entry angle ($\geq 70^\circ$)
Radius $10\text{--}15\text{ m}$

Slip lanes – pedestrian crossing provisions



Not our focus

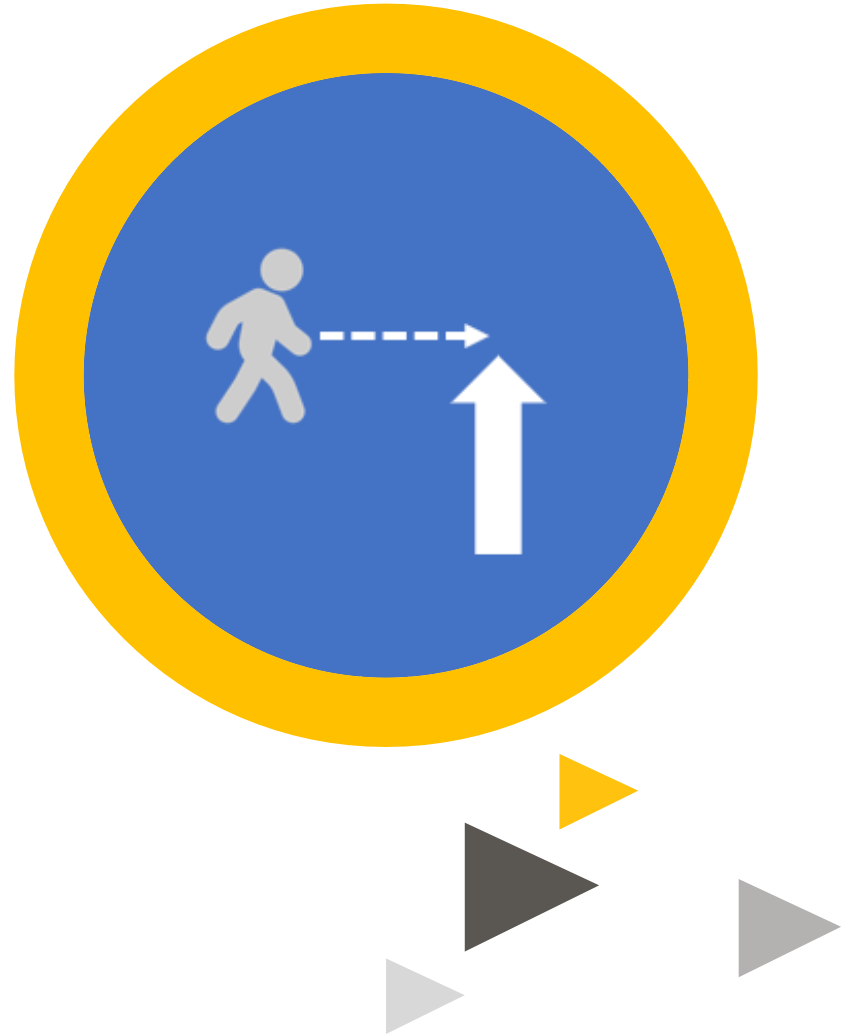


Free-flow slip lanes
(conflict-free departure)



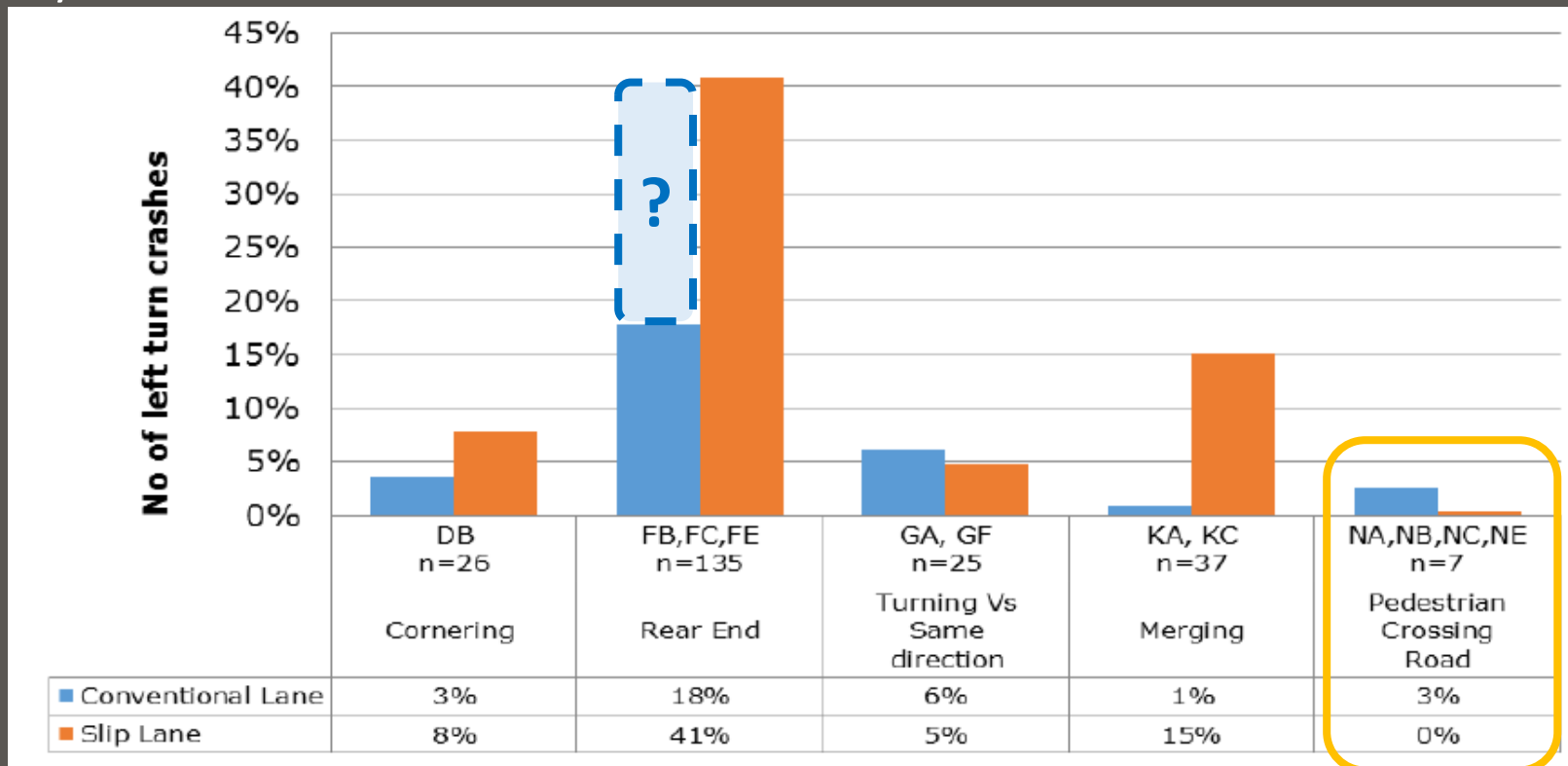
“Signalised” slip lanes
(conflict-free phasing)

Safety performance



General safety performance

- Sharobim (2016):
 - All left turn crashes, 1,818 sites, 1 year:
 - Slip lanes = 41% of treatments but 69% of crashes
 - Likely a number of rear-end crashes at conventional lanes excluded due to ambiguity



General safety performance – treatments

- Sharobim (2016):
 - All left turn crashes, 267 sites, 5 years, accounting for traffic exposure:
 - “comparable safety performance”
 - Without accounting for slip lane angle (other sources show HEA safer than LEA)

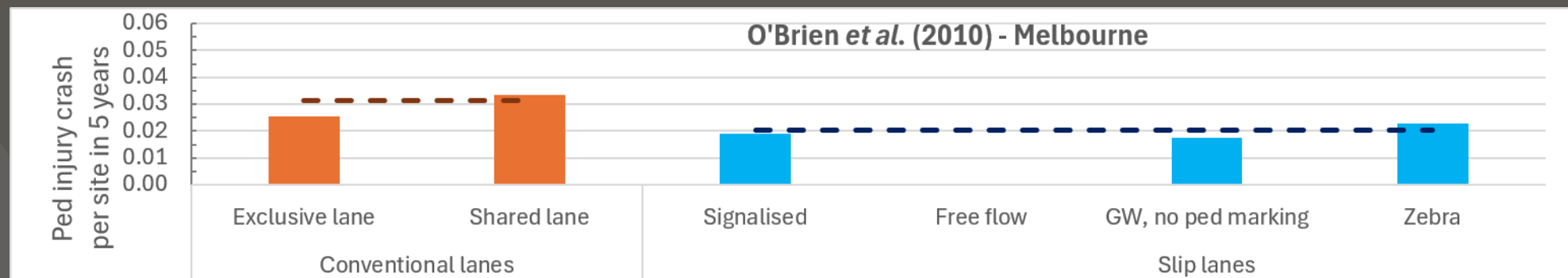
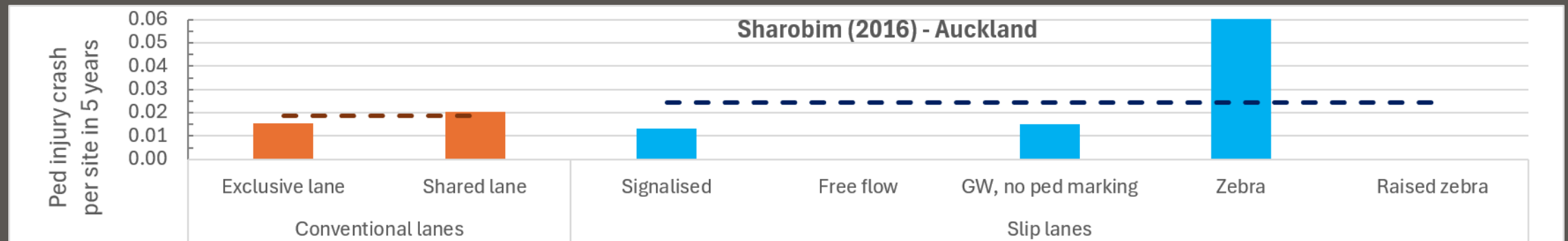
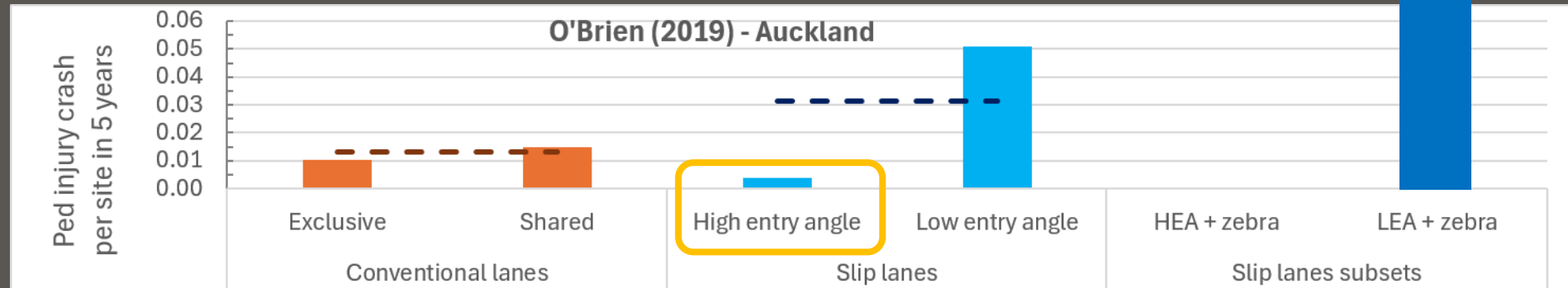
Left Turn Treatment Type		Exposure per entering vehicles X 10 ⁸ X 5Yrs (100 MEV)		Left turn crash types		Left turn crash rate (5Yrs)
		approach Volume	% of approach Volume	No. of left turn crashes	% of left turn crashes	
Slip Lane	Signalised	3.0	7%	19	14%	6.42
	Free Flow	2.5	6%	3	2%	1.19
	Giveway No Pedestrian Marking	10.0	23%	27	19%	2.70
	Zebra Crossing	7.2	17%	23	16%	3.18
	Raised Zebra Crossing	0.0	0%	0	0%	0.00
	Slip Lane Sub Total	22.7	52%	72	51%	3.17
Conventional Lane	Exclusive Lane	5.2	12%	29	21%	5.53
	Shared lane	15.8	36%	39	28%	2.46
	Conventional Lane Sub Total	21.1	48%	68	49%	3.23
	Overall	43.8	100%	140	100%	3.20

Pedestrian safety – key sources

Study	Location	# left turn approaches	Analysis period
Andrew O'Brien (2019)	Auckland	1,696	2013–2017
Romany Sharobim (2016)	Auckland	1,818	2010–2014
Mark O'Brien <i>et al.</i> (2010 & 2012)	Melbourne	6,978	2004–2008

- Included free-flow and signalised slip lanes
- None accounted for pedestrian exposure
 - Pedestrian crossings more likely provided where there is higher crossing demand
- Jaglal and Wilson (2012, Auckland): *where a treatment compromises intersection efficiency, users may respond by making risky or non-compliant choices*

Pedestrian safety – findings

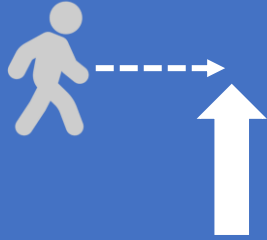


Pedestrian safety – further observations

O'Brien *et al* (2010, Melbourne)

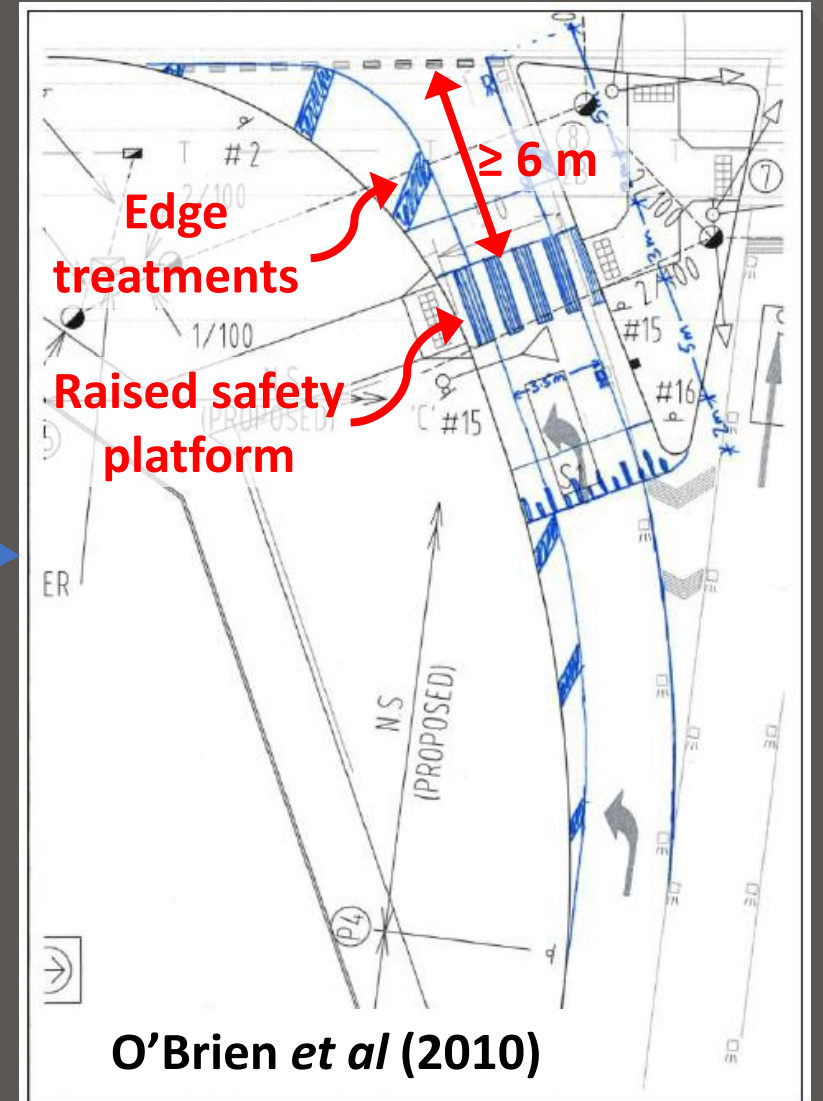
Each HEA
slip lane:

$\geq 1 \times$



O'Brien (2019, Auckland)

Only **one** pedestrian crash
across **265** HEA slip lanes.

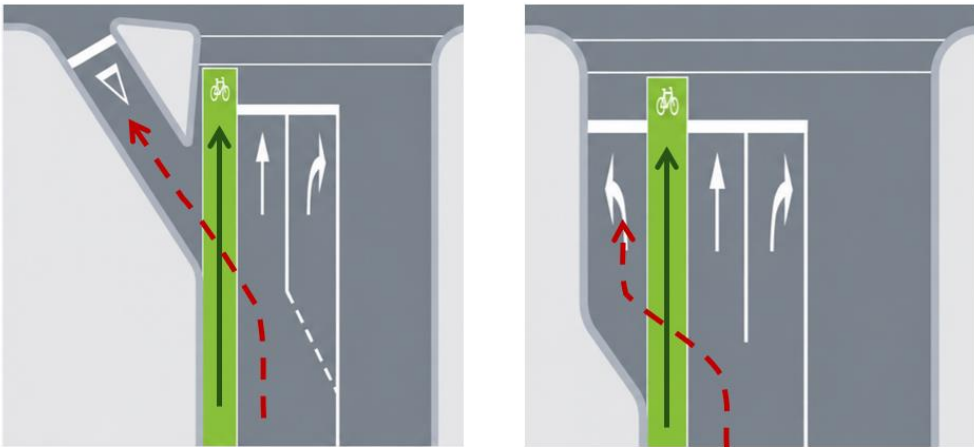


Cyclist safety

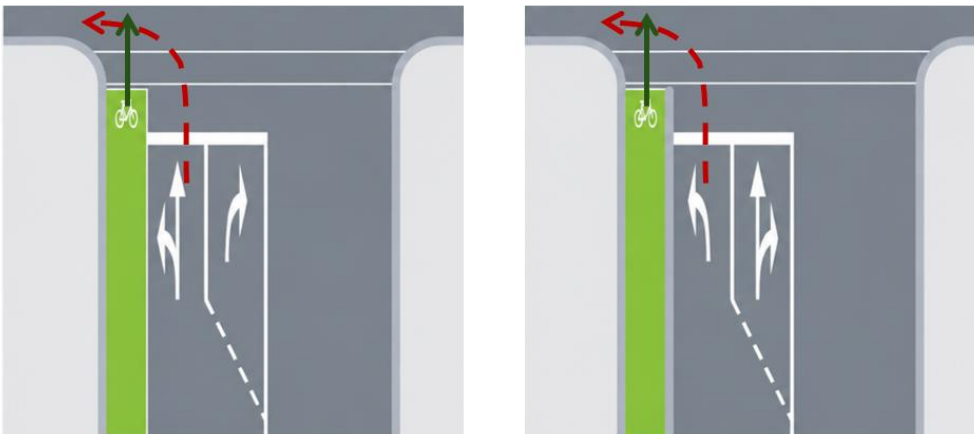
- Safer to address conflict on the approach vs through the intersection
 - Easier to do with slip lanes and exclusive left turn lanes

Conflict on approach to intersection:

~4x safer



Conflict through intersection:



- Risks for cyclists across a slip lane exit
 - HEA and raised crossings help mitigate this

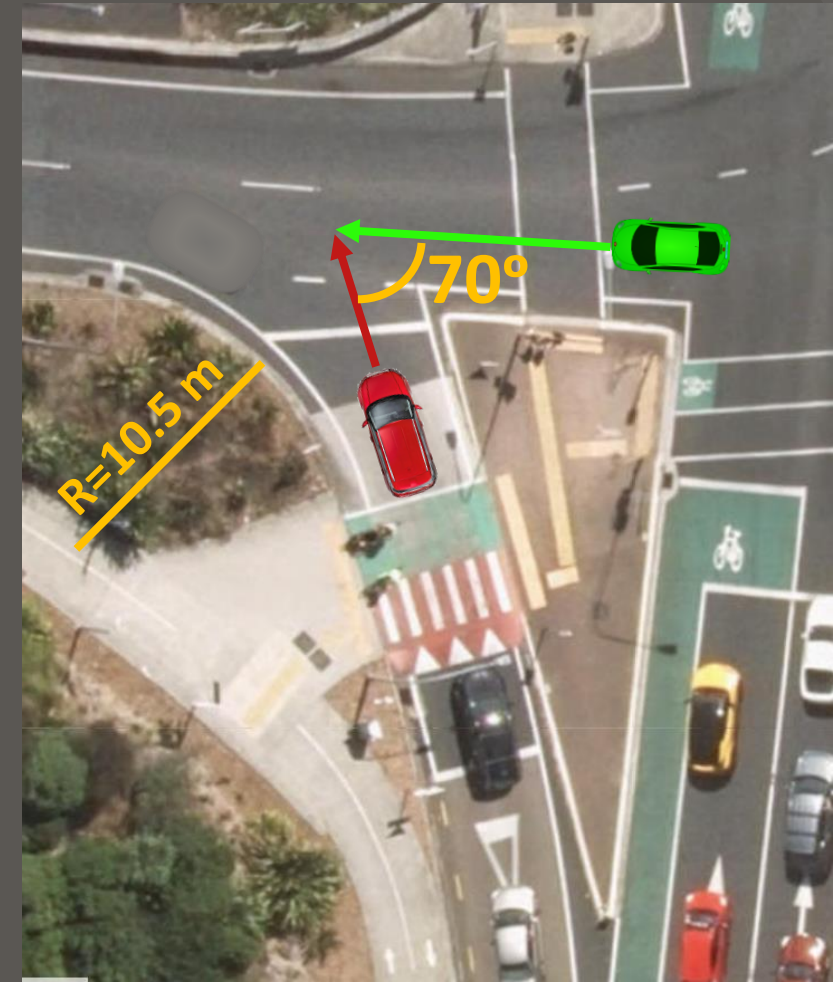


Conclusions

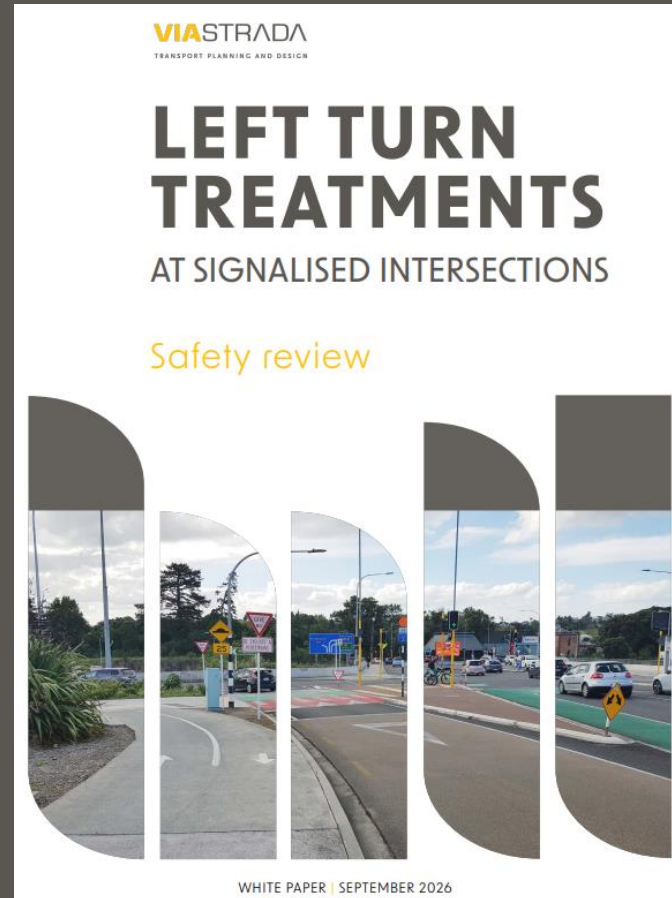


Not all slip lanes are created equal

- Slip lanes and conventional signalised left turns have *comparable* general safety
- High entry angle slip lanes are the safest for pedestrians
 - Raised crossings and other treatments can further improve this
- Further research:
 - Account for pedestrian exposure
 - Study cyclist safety



Find out more



[https://viastrada.nz/
publication/
left-turn-treatments-
signalised-intersections](https://viastrada.nz/publication/left-turn-treatments-signalised-intersections)

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